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ACQUISITION OF OPERATIONAL DATA DURING NOE MISSIONS.(U)

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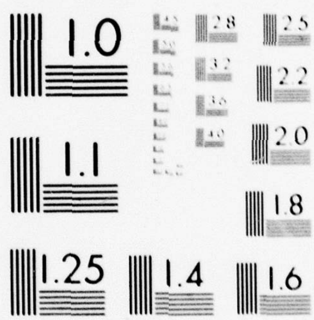

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NATIONAL BUREAU OF STANDARDS-1963-A

USARTL-TR-78-3

ACQUISITION OF OPERATIONAL DATA DURING NOE MISSIONS

Terry L. Cox
F. Joseph Giessler

Technology Incorporated
P. O. Box 3036, Overlook Branch
Dayton, Ohio 45431

April 1978

Final Report for Period September 1976 - October 1977

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Fort Eustis, Va. 23604

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

For the continued development and updating of the operational usage spectrum of Army helicopters, a UH-1H helicopter assigned to nap-of-the-earth (NOE) training missions at Fort Rucker, Alabama, was instrumented with an oscillograph and a photopanel recording system. Two oscillographs collectively recorded 20 different flight parameters, and a photopanel assembly monitored 9 other flight parameters. Between December 1976 and

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April 1977, 14.9 hours of valid data over the NOE course were recorded. For the optimum representation and interpretation of the helicopter's performance, the data were processed by the Flight Condition Recognition (FCR) method. In this program, the FCR technique was used to identify 29 flight conditions (including maneuvers and operational categories). These included turns and steady-state flight according to the occurrence and duration of a single flight parameter or combinations of them, each in a specific range. In addition, some flight parameters were processed as parameters peaking outside a threshold and others as increasing or decreasing excursions within a specific time span. The data presentation includes the operational usage spectrum expressed as the percentage of time in the flight condition categories and various graphic depictions of typical NOE mission profiles. In terms of vertical acceleration (n_z) data, the operational usage spectrum for the current NOE mission program was relatively mild compared with those derived from other programs with the conventional mixture of mission types.

PREFACE

This program was conducted by Technology Incorporated for the Eustis Directorate, U.S. Army Air Mobility Research and Development Laboratory (USAAMRDL)* under Contract DAAJ02-76-C-0065. Mr. Terry L. Cox and Mr. F. Joseph Giessler served as program managers at Technology Incorporated. Mr. W. T. Alexander was the USAAMRDL technical monitor.

Technology Incorporated is pleased to acknowledge the personnel of both the U.S. Army Aviation Center and the Northrop Corporation for their outstanding support and cooperation and, in particular, Messrs. Joseph Meriweather and Gordon Meecham of Fort Rucker for their generous liaison contributions.

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* Redesignated Applied Technology Laboratory, U.S. Army Research and Technology Laboratories (AVRADCOM), effective 1 September 1977.

TABLE OF CONTENTS

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LIST OF ILLUSTRATIONS

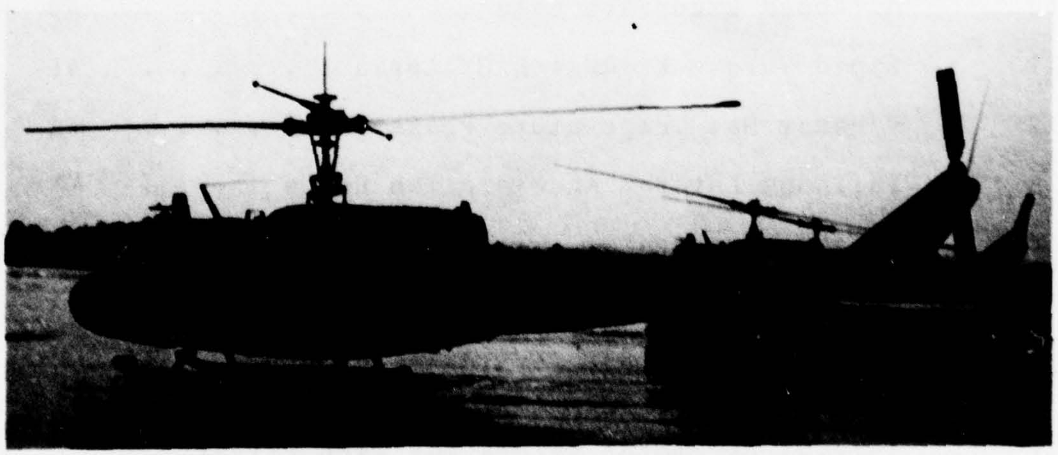
LIST OF TABLES

1. INTRODUCTION

For the continued study of Army helicopter operations, a multichannel operational usage data program was conducted on an Army UH-1H helicopter performing nap-of-the-earth (NOE) training missions at Fort Rucker, Alabama. Between December 1976 and April 1977, 14.9 hours of valid NOE data were recorded by an oscillograph type of recording system. These data were then processed by the Flight Condition Recognition (FCR) method to permit the optimum representation and interpretation of the helicopter's operational usage.

The program objectives were to acquire NOE mission training data, to analyze the data and then define a representative mission profile, and to evaluate the recording system to determine the minimum requirements for future NOE operational surveys.

The UH-1H helicopter is an all-metal, single-engine helicopter. A single, two-bladed, semirigid teetering main rotor provides lift, and a two-bladed, semirigid, delta-hinged tail rotor provides antitorque and directional control. Figure 1 presents a photograph of the UH-1H aircraft and a summary of its characteristics and limitations. An oscillograph-type recording system was used to record 20 different



Characteristics		Limitations	
rotor diameter	48 ft	normal rated power	1250 hp
rotor solidity	0.0464	military rated power	1400 hp
engine Lycoming	T-53-L-13	usable power (transmission limit)	1100 hp
design max gross wt	9500 lb	100% rotor speed	324 rpm
empty weight (avg)	4920 lb	max airspeed	120 kn

Figure 1. View of UH-1H Test Helicopter with Summary of Aircraft Characteristics and Limitations

inflight parameters, which are listed in Tables 1 and 2. Of these parameters, altitude, engine torque, lateral airspeed, vertical and lateral acceleration at the aircraft cg, main rotor speed, and forward airspeed were processed for subsequent data presentation. The remaining parameters were used to aid the identification of flight conditions during the data processing and were reviewed during the recording system evaluation. In addition, a photopanel system was used to monitor the aircraft indicators for the nine parameters listed in Table 3.

This report describes the recording system; presents typical mission profile data, including actual position diagrams, flight condition information, and parameter excursion data; evaluates the recording system; draws significant conclusions; and offers recommendations for future NOE recording programs.

TABLE 1. PARAMETERS RECORDED ON OSCILLOGRAPH NO. 1

Parameter	Transducer Location/Access	Transducer Type
pressure altitude	forward battery compartment	pressure transducer
engine torque	right-side engine	pressure transducer
lateral airspeed	main rotor mast	pressure transducer
collective position	beneath cargo floor	potentiometer
yaw attitude	cargo compartment	potentiometer
n_z at cg	FS 132, WL 70	accelerometer
main rotor speed	pilot's instrument panel	A/C rotor tach generator
longitudinal cyclic position	beneath cargo floor	potentiometer
n_y at cg	FS 132, WL 70	accelerometer
lateral cyclic position	beneath cargo floor	potentiometer
rudder pedal position	beneath cargo floor	potentiometer
forward airspeed	main rotor mast	pressure transducer

TABLE 2. PARAMETERS RECORDED ON OSCILLOGRAPH NO. 2

Parameter	Transducer Location/Access	Transducer Type
outside air temperature	outer skin, bottom	temperature ribbon
engine torque	right-side engine	pressure transducer
roll rate	cargo compartment	potentiometer
pitch rate	cargo compartment	potentiometer
yaw attitude	cargo compartment	potentiometer
n_z at cg	FS 132, WL 70	accelerometer
yaw rate	cargo compartment	potentiometer
pitch attitude	cargo compartment	potentiometer
n_x at cg	FS 132, WL 70	accelerometer
roll attitude	cargo compartment	potentiometer
n_y at tail	tail boom	accelerometer
forward airspeed	main rotor mast	pressure transducer

TABLE 3. PARAMETERS MONITORED ON THE PHOTOPANEL

Engine Torque
Exhaust Gas Temperature
Indicated Airspeed
Pressure Altitude
Heading
Rotor Speed
Forward/Lateral Airspeed
Time
Sonic Altitude

2. TECHNICAL DISCUSSION

All data measured and recorded during the NOE training flights at Fort Rucker, Alabama, were edited for validity and usefulness. These valid data were then processed and documented in three distinct ways to provide mission profile data that accurately represents NOE flight and terrain following conditions. The airspeed, altitude, and heading data used to develop the actual flight profiles were taken from the photopanel readings. The oscillograph data were edited according to the FCR method to identify the 29 flight conditions listed in Table 4. With the various parameter traces associated with the appropriate flight conditions, the trace deflections were then measured and converted to their respective engineering values. In addition, the airspeed, rotor speed, and engine torque traces were edited for various types of excursions, and the photopanel exhaust gas temperature data were also scanned for excursions. The following sections present and discuss the instrumentation, the data processing criteria, and the resulting data.

2.1 Airborne Recording System

The NOE mission data were acquired by installing two oscillograph recorders, two signal conditioning units, various remote sensors, and a photopanel in a helicopter assigned to NOE mission training. These components and their installation are described in the following paragraphs. Reference 1 presents detailed drawings and stress analyses for the entire installation.

2.1.1 Oscillograph Recorders

Each of the two oscillograph recorders was a Century Electronics Model 409. As shown in Figure 2, this model measures 12 by 5 by 5-15/16 inches, weighs approximately 13 pounds, and requires a 28-VDC, 3-ampere power source. During this program, each recorder had 14 galvanometer channels; one to produce a static measurement reference, one to produce a timing trace, and 12 to produce time histories of 12 dynamic parameters.

[1] Cox, T., Culbertson, K., and Nolfi, J., THE INSTRUMENTATION SYSTEM FOR RECORDING OPERATIONAL DATA DURING NOE MISSIONS, Technology Incorporated Report No. TI-078520-76-3, Instruments and Controls Division, Technology Incorporated, Dayton, Ohio, October 1976.

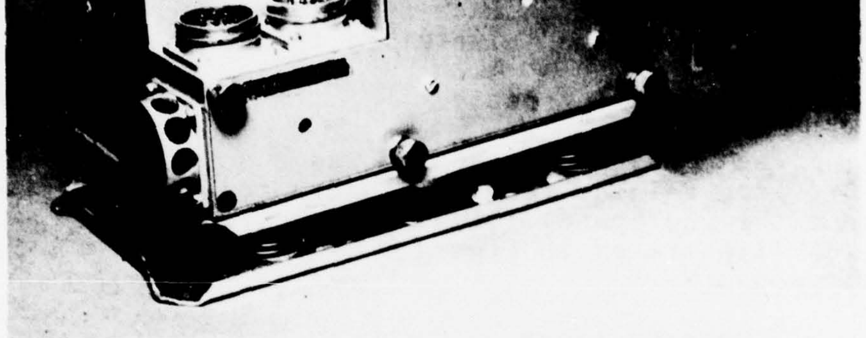
TABLE 4. FCR FLIGHT CONDITIONS AND MISSION SEGMENTS

FLIGHT CONDITIONS

1. Rotor Start
2. Steady State
3. Transient
4. Normal Takeoff
5. Collective Pushover
6. Collective Pullup
7. Deceleration
8. Touchdown
9. Rotor Stop
10. Maximum Performance Takeoff
11. Left Turn
12. Right Turn
13. Cyclic Pushover
14. Cyclic Pullup
15. Longitudinal Reversal
16. Lateral Reversal
17. Rudder Reversal
18. Left Sideward Flight
19. Right Sideward Flight
20. Flight Condition Separation
21. Rearward Flight
22. Initiation of Ascent
23. Pop-Down
24. Not Used
25. Airspeed Acceleration
26. Quick Stop
27. Begins-in-Flight
28. Ends-in-Flight
29. Non-NOE Data
30. Pop-Up

MISSION SEGMENTS

1. Ground Conditions
2. Hover (<15 kn)
4. Non-NOE
8. NOE (>15 kn)



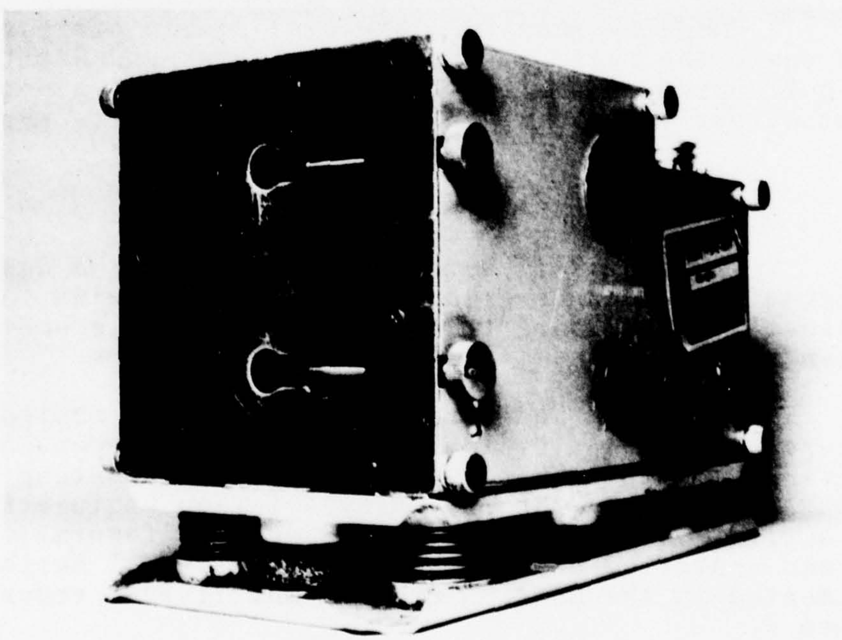


Figure 2. Views of Century Oscillograph Recorder with Oscillogram Magazine Attached and Removed

2.1.2 Signal Conditioning Units

The signal conditioning units (SCU), designed and fabricated by Technology Incorporated, conditioned the output signal of the remote sensors to provide the input to the oscillograph recorders. Each SCU was a sheet metal box containing 13 printed circuit (PC) boards, a precision oscillator, a power supply, and connections for remote sensor cables. The PC boards provided (1) the means for completing Wheatstone bridges for 11 of the 12 data channels, (2) the means for supporting the 12th data channel, a precision oscillator circuit that converts the rotor speed to voltage, (3) the timing signal channel, and (4) the static reference-trace channel. Each SCU provided the means for balancing, scaling, and calibrating the data channels.

2.1.3 Photopanel Assembly

The photopanel assembly was a separate system which provided all the required camera control functions and contained the photopanel illumination circuits. Each indicator, as illustrated in Figure 3, interfaced with existing aircraft sensors.

2.1.4 Stable Platform

A Humphrey Model CF 18-0402-1 stable platform was used to sense the roll, pitch, and yaw rates and attitudes of the helicopter. Each of these parameters had a potentiometer output that varied proportionately to its physical input.

2.1.5 Remote Sensors

Various sensors were used to monitor the desired parameters. They can be grouped into the following four categories: (1) pressure transducers, (2) accelerometers, (3) potentiometers, and (4) miscellaneous sensors.

The forward and lateral airspeed were monitored by an orthogonal airspeed system manufactured by Rosemount Engineering Company. This system, including mounting hardware, was supplied by the U.S. Army Aviation Engineering Flight Activity, Edwards Air Force Base, California. This system was installed and flight tested on a UH-1 helicopter, as documented in the USAAEFA Project No. 71-30-5 report, Reference 2.

For the current program, the airspeed system was mounted above the main rotor to obtain the in-flight data in

the same manner as reported in Reference 2. Accordingly, a stationary standpipe was installed through the main rotor mast to provide a platform for the system.

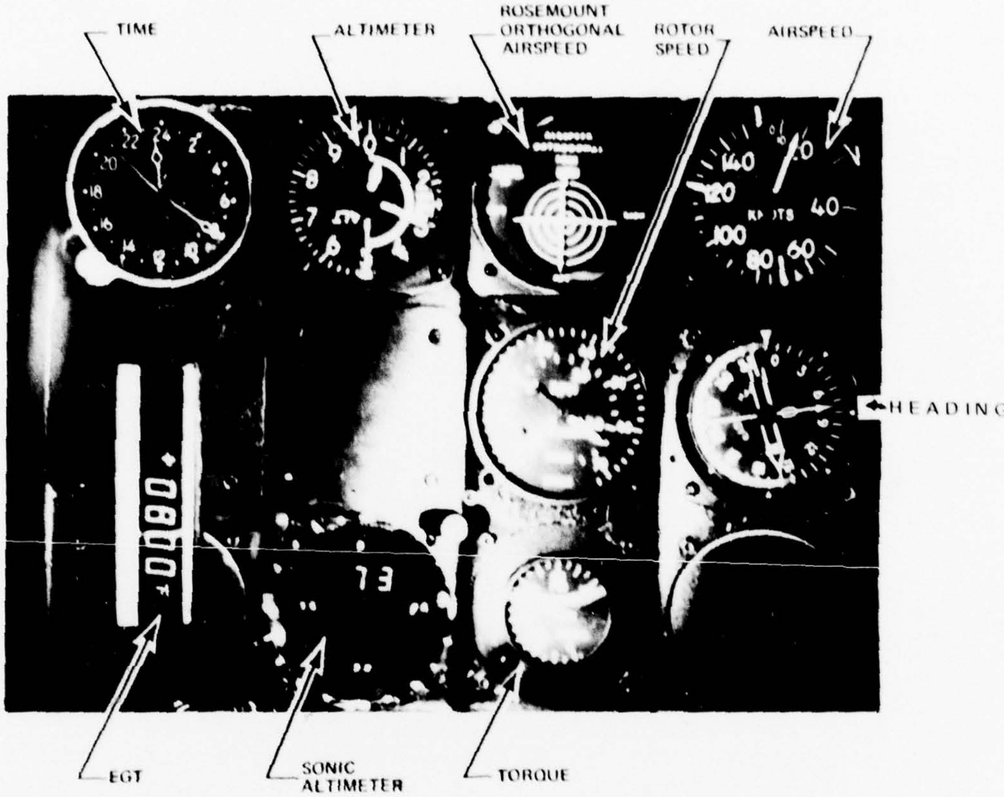


Figure 3. Photopanel Indicators

Engine torque data were acquired by a strain gage type of pressure transducer installed in parallel with the aircraft's torque transducers to monitor the transmission oil pressure.

A strain gage type of pressure transducer sensed the aircraft's static pressure to provide altitude data.

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[2] Jefferis, R.P., O'Connor, J.C., and Bullock, J.R., FLIGHT EVALUATION ROSEMOUNT ORTHOGONAL LOW AIRSPEED SYSTEM LOW AIRSPEED SENSOR FINAL REPORT V, USAAEFA Project No. 71-30-5, U.S. Army Aviation Engineering Flight Activity, Edwards Air Force Base, California, November 1974.

The transducers to sense the cg normal (vertical), the cg lateral, and the lateral tailboom accelerations were linear accelerometers, each incorporating a balanced, fully active strain gage bridge. The transducer to sense the fore-aft cg acceleration was located in a Humphrey Model CF18-0402-1 stable platform.

To sense the lateral and longitudinal cyclic control stick positions, the collective stick position, and the rudder pedal position, infinite-resolution potentiometers were used. These units were wired so that the potentiometer acted as two arms of a Wheatstone bridge circuit. Connected by special actuators to the control linkages, these potentiometers sensed the movement of the respective control systems.

The outside air temperature was monitored with a thermal ribbon. The ribbon was attached to, but insulated from, the outer skin of the aircraft. The ribbon is a resistor whose resistance varies with the temperature and was used as the active arm of a Wheatstone bridge circuit.

To monitor the rotational speed of the main rotor, a special circuit was designed and fabricated. The circuit was composed of all solid-state materials and mounted on a printed circuit board within the signal conditioning unit.

The output of the aircraft's rotor tach generator was used as an input to a special circuit for the control of an oscillator. The oscillator triggered a gate that varied a DC circuit between 0 and +5 VDC. The resulting signal was filtered to a variable continuous DC signal suitable for recording. The variation of the signal sent to the recorder was proportional to the variation of the rotor rpm.

The photopanel assembly included standard aircraft indicators for engine torque, indicated airspeed, altitude, heading, and main rotor speed. Digital displays of exhaust gas temperature and sonic altitude were also provided. A standard Rosemount Engineering orthogonal airspeed indicator was used to obtain low airspeed data. In addition, a 24-hour clock was displayed so that the photopanel data could be correlated with the oscillograph data.

2.2 Data Summary

2.2.1 NOE Mission Scenario

In general, the NOE training missions followed the

NOE combat scenario. In the combat scenario the NOE helicopter will be deployed to a forward holding area to await a call to action. En route to the holding area, the pilot will follow paths that avoid enemy detection; hence, the pilot will fly typical NOE techniques at airspeeds below 50 knots. In the holding area the aircraft will remain in low orbit or on the ground with engines running until it advances to the assault position, again with the pilot using NOE techniques and then slowing to a hover. After moving to the firing position while maneuvering between trees and obstacles at hover or at airspeeds below 15 knots, the helicopter will pop up to acquire a target and then initiate missile and/or gun firing. The helicopter will then fly sideward so that the pilot and gunner may maintain line-of-sight contact with the enemy. After the firing, the helicopter will drop behind masking terrain and fly NOE out of range of the enemy weapons.

As illustrated in this section, many of these techniques were used during the NOE training with the resultant operational usage data being very different from the traditional UH-1H utility mission data. The processed data are presented as flight profiles, flight condition tables, parameter excursions, and sample oscillograms in the following paragraphs.

2.2.2 Mission Performance Profiles

The data in this section represent a mission profile that is representative of the NOE training mission. In general, the aircraft was at a low gross weight (7700 to 7900 pounds) and a neutral cg (FS 137 to 138) at takeoff. Thus, cargo was not carried and only one or two passengers were on board during each flight. As shown in Table 5, the in-flight temperatures and density altitudes were moderate. Consequently, the engine power required to hover and to fly at low airspeeds was not very high, as indicated in both the flight condition and the torque excursion data. The number of NOE mission segments and their respective durations are also shown in Table 5. Almost every flight had four or five segments which were classified as NOE; that is, they had periods of low airspeed and altitude, fluctuating torque, and numerous control stick movements. Figures 4 and 5 illustrate airspeed and altitude profiles, respectively, for a typical flight. Three periods of NOE flight are evident in these figures. During the NOE segments, the airspeed frequently fluctuated dramatically because of the sensitivity of the airspeed system to changes in the wind direction, gusts, and minor variations in the airspeed control.

TABLE 5. NOE FLIGHT DATA

Flight	No. of NOE Segments	NOE Segment Length (min)	Average Temperature (°F)	Average Density Altitude (ft)
A12	6	10.8	67	465
		42.4	67	484
		9.3	68	536
		44.2	67	465
		13.8	66	361
		22.2	64	264
A13	6	17.2	73	1313
		5.8	71	1141
		9.2	71	1141
		36.4	*	*
		3.4	*	*
		16.5	*	*
A14	4	9.4	47	-530
		8.6	46	-605
		6.2	50	-321
		10.9	49	-395
A15	4	7.5	59	235
		11.5	55	-23
		13.7	54	-69
		17.3	53	-149
A16	3	14.3	36	-1500
		4.3	40	-1209
		9.2	40	-1264
A17	4	25.5	45	-809
		38.4	44	-884
		13.2	45	-857
		38.1	42	-1041
A18	5	15.4	52	-360
		6.9	53	-320
		35.0	54	-266
		18.2	56	-140
		41.3	54	-220
A19	5	16.7	45	-786
		57.8	51	-428
		7.3	59	130
		32.2	59	104
		19.7	61	281
A22	4	18.4	36	-1525
		13.0	43	-1090
		13.8	44	-987
		7.5	47	-831
A24	4	20.1	63	295
		6.3	63	295
		2.8	62	223
		22.6	61	197
A25	4	10.2	54	-36
		15.9	57	143
		8.1	69	918
		14.5	72	1110
A30	2	14.5	68	811
		17.1	67	785

* In middle of flight, OAT trace became static and therefore invalid because of power turnoff of signal conditioning unit No. 2.

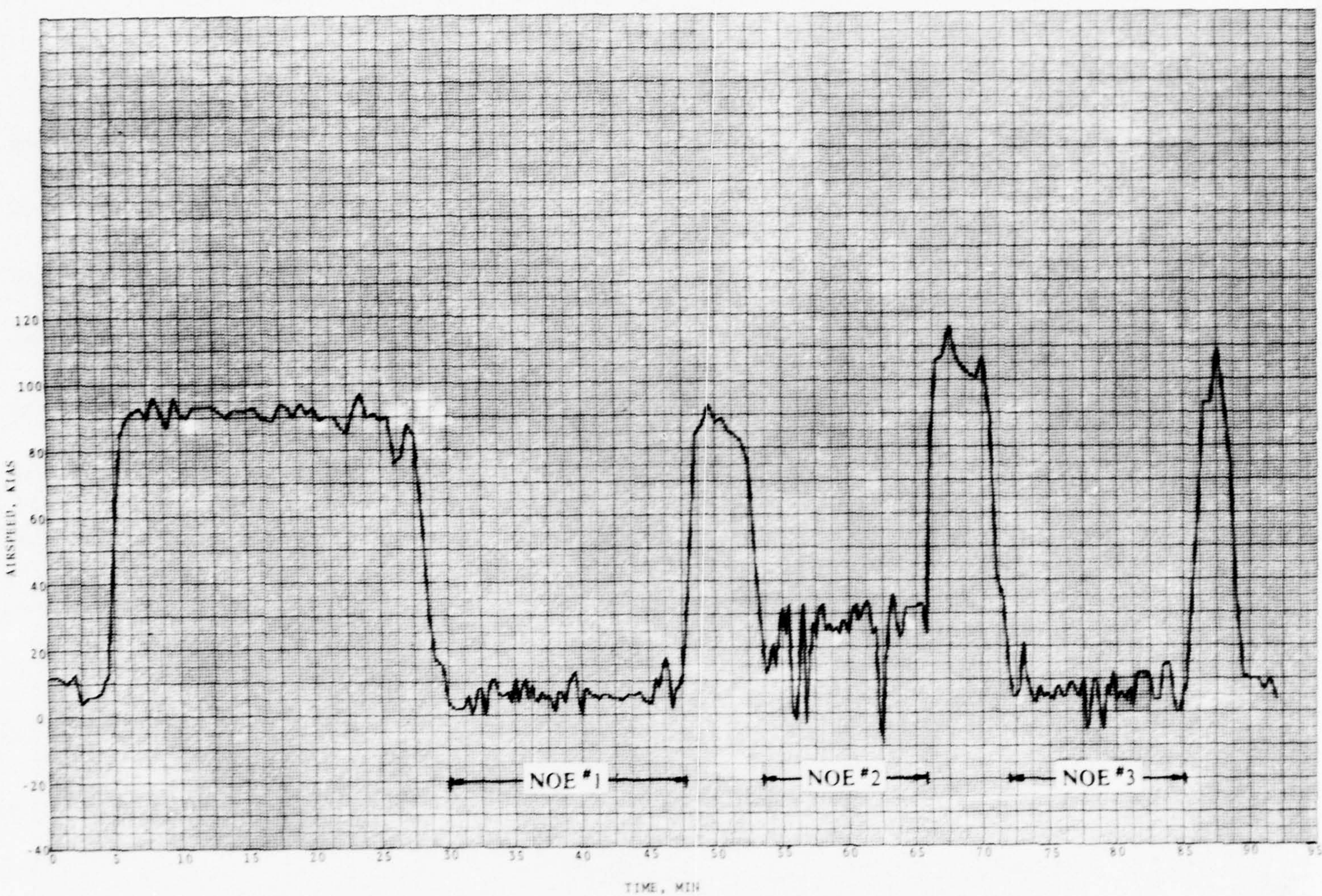

Figure 4. Airspeed Profile for Typical NOE Training Flight

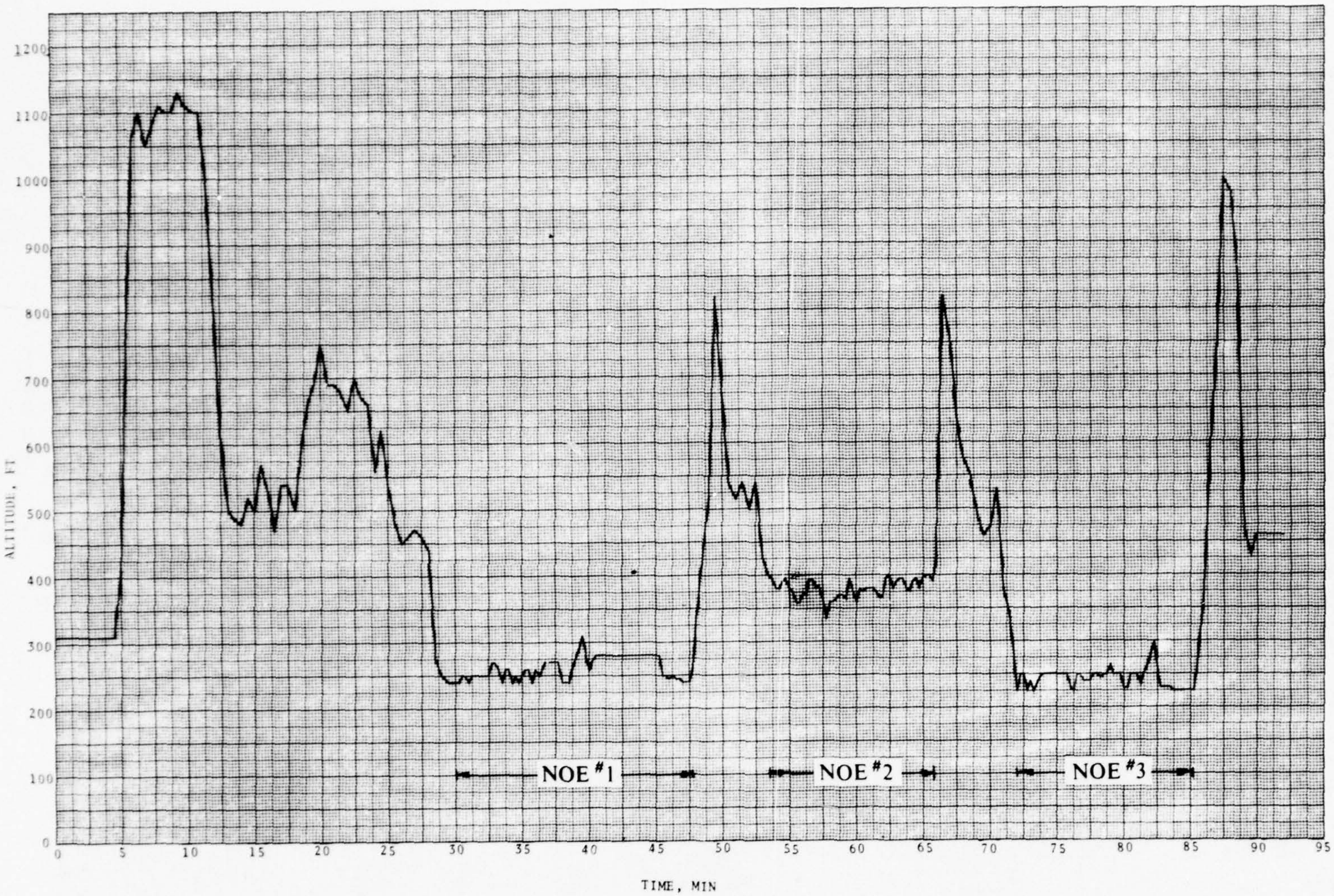

Figure 5. Altitude Profile for Typical NOE Training Flight

To put the airspeed and altitude profiles in perspective, Figure 6 illustrates the flight path for the same typical flight. Normally, after flying the long cruise distance to the NOE training area, the helicopter descended onto a landing zone, performed a series of NOE hover checks, and then flew over the NOE course. Frequently, there would be a hot refueling between course runs and the course would be reflown. As the airspeed and altitude profiles in Figures 4 and 5 show three NOE periods, the NOE position plot numbers in Figure 6 indicate the corresponding three NOE courses. After the initial cruise to the course, the remaining cruises and NOE-type flights appear to have occurred over the same geographical area. Consequently, it is surmised that the helicopter was maneuvered over different portions of the same course.

The helicopter position plot curves in Figures 7, 9, and 12 (for NOE Sections 1, 2, and 3, respectively) are the individual flight paths corresponding to those shown by the solid curves in Figure 6. Table 6 details the entire performance, from base departure to base return, of the typical NOE training mission depicted in Figure 6. Based on the occurrences of the successive flight conditions, this table lists the following for each occurrence: the mission segment in which the flight condition prevailed, the flight condition category, the mission cumulative (photopanel) time at the occurrence onset, the flight condition duration (delta time), and the values for eight aircraft parameters at the onset of the flight condition. The encircled successive numbers keyed to the curves in Figures 7, 9, and 12 correlate with those in Table 6. These numbers denote discrete maneuvers that were performed by the pilot while traversing the NOE course.

In Figure 7 for the first NOE segment, the helicopter flew about 18 minutes over the course. During this NOE segment, numerous takeoffs and landings occurred, and a pop-up maneuver was initiated from the ground rather than from a hover as would normally be expected. In addition, there was a maximum performance takeoff as illustrated in Figure 8. As seen in this figure, the rapid increase in the collective control position and the engine torque initiated the takeoff. Since the parameter values listed below the oscillogram are those at the start of the takeoff, the engine torque was initially only 12 psi, but it peaked at 34 psi within 3 seconds. The rapid change in engine torque was the reason for identifying this maneuver as a torque excursion, as discussed in the next section. Generally, a maximum performance takeoff and a normal takeoff could be distinguished only by the rapidity of the change in the collective stick position and the engine torque.

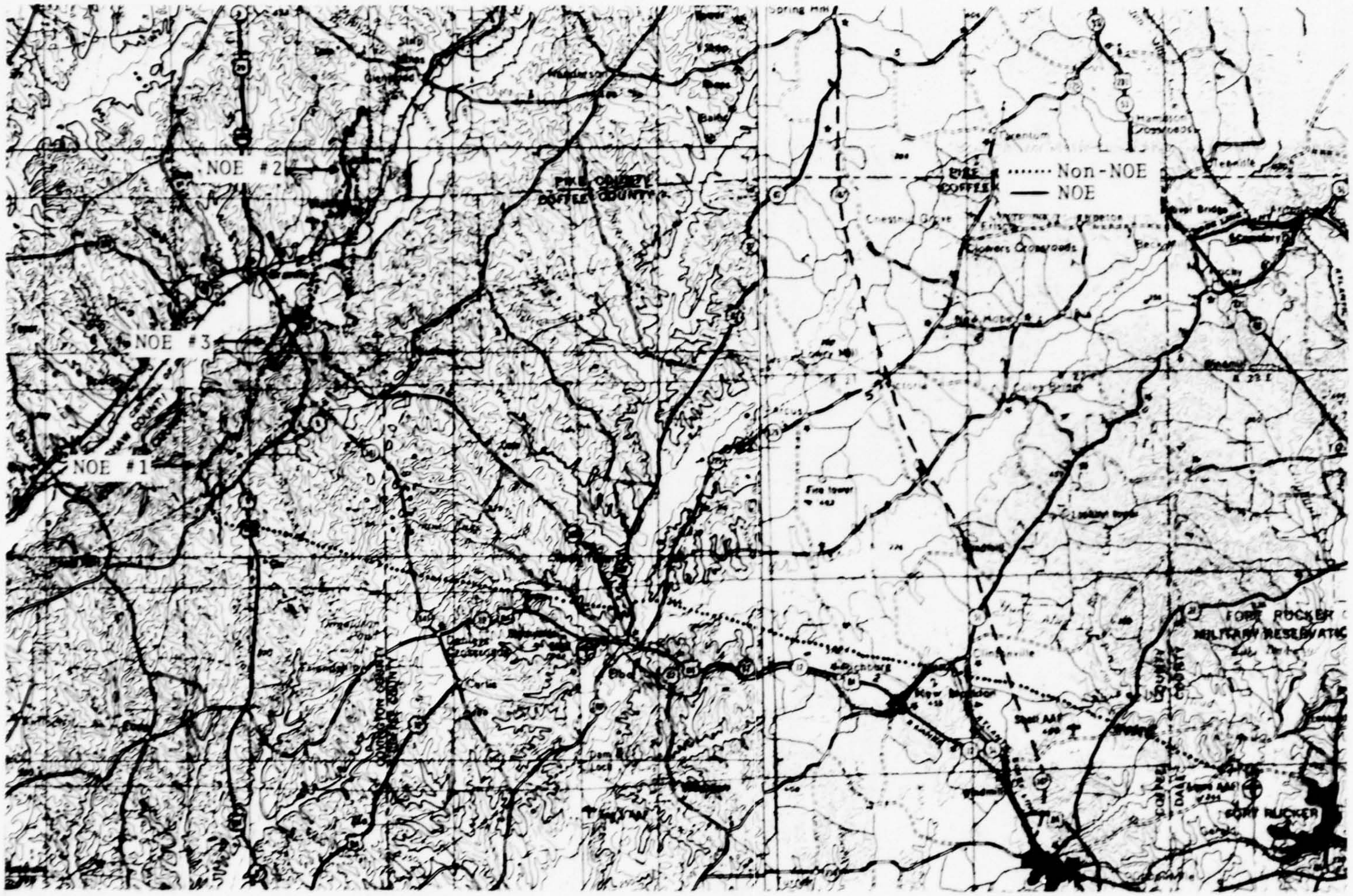

Figure 6. Flight Position Plot for Typical NOE Mission Profile

TABLE 6. FLIGHT CONDITION AND PARAMETER DATA FOR A TYPICAL NOE TRAINING FLIGHT

	MISS SEG	FLT COND	PANEL TIME	DELTA TIME	GROSS WEIGHT	MAIN FUEL	AUX FUEL	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
	4	1	0.00	0.00	7705	1359	0	5.5	-1.9	-19	241	0
	4	29	0.00	39.01	7705	1359	0	5.5	-1.9	-19	241	0
	1	2	36.28	.62	7402	1056	0	2.2	-1.4	-109	322	26
1	2	4	36.86	.22	7397	1051	0	2.9	.6	-68	322	12
	2	2	37.06	.26	7395	1049	0	.8	-.2	-102	321	27
	2	11	37.30	.49	7393	1047	0	2.7	3.7	-89	321	32
	2	20	37.76	0.00	7389	1043	0	.8	0.0	-68	322	32
	2	11	37.76	.32	7389	1043	0	.8	0.0	-68	322	32
	2	2	38.06	.39	7387	1041	0	8.2	1.1	-68	321	33
	2	11	38.42	.37	7384	1038	0	8.5	1.3	-68	321	32
	2	20	38.76	0.00	7381	1035	0	-.8	.2	-40	321	34
	2	11	38.76	.37	7381	1035	0	-.8	.2	-40	321	34
	2	2	39.10	.56	7378	1032	0	7.1	1.1	-40	321	32
2	2	8	39.62	0.00	7374	1028	0	3.2	-1.1	-96	323	26
	1	2	39.62	.60	7374	1028	0	3.2	-1.1	-96	323	26
3	2	10	40.18	.06	7369	1023	0	3.0	1.0	-68	322	12
	2	2	40.24	.71	7369	1023	0	2.9	-1.6	-102	320	30
	2	11	40.90	.30	7363	1017	0	4.6	1.8	-68	321	32
	2	20	41.18	0.00	7361	1015	0	2.4	2.1	-54	320	33
	2	11	41.18	.15	7361	1015	0	2.4	2.1	-54	320	33
	2	2	41.32	.45	7359	1013	0	6.6	.3	-68	322	32
4	2	8	41.74	0.00	7356	1010	0	1.6	.2	-89	323	26
	1	2	41.74	.32	7356	1010	0	1.6	.2	-89	323	26
5	2	30	42.04	.17	7353	1007	0	4.0	.5	-61	322	12
	2	2	42.20	.11	7352	1006	0	3.2	2.2	-82	320	32
6	2	8	42.30	0.00	7351	1005	0	4.8	.3	-96	323	25
	1	2	42.30	1.55	7351	1005	0	4.8	.3	-96	323	25
7	2	4	43.74	.13	7339	993	0	2.2	.8	-54	322	12
	2	2	43.86	1.44	7338	992	0	1.4	-2.4	-89	321	26
	2	5	45.20	.09	7327	981	0	6.6	1.1	8	320	36
	2	6	45.28	.11	7326	980	0	6.4	.5	36	322	27
	2	2	45.38	.65	7326	980	0	8.5	2.1	-5	319	35
8	2	8	45.98	0.00	7321	975	0	4.5	1.0	-96	323	25
	1	2	45.98	1.66	7321	975	0	4.5	1.0	-96	323	25
9	1	3	47.52	.28	7308	962	0	2.7	.3	-33	321	13
	1	2	47.78	3.14	7306	960	0	2.7	.2	-26	273	8
	1	3	50.70	.19	7281	935	0	2.4	1.6	-19	273	10
	1	2	50.88	.11	7280	934	0	1.6	1.4	-19	320	13
	2	4	50.98	.22	7279	933	0	2.7	1.1	-40	320	12
10	2	12	51.18	.22	7277	931	0	3.8	-1.0	-68	320	27
	2	2	51.38	.95	7275	929	0	2.7	3.2	-68	320	31
11	2	11	52.26	.19	7268	922	0	4.5	1.0	-75	321	30
	2	2	52.44	.82	7267	921	0	2.2	0.0	-61	322	27
12	2	22	53.20	.22	7260	914	0	9.1	1.9	-61	321	28
	4	29	53.40	5.96	7259	913	0	18.8	3.7	-19	321	32
	2	14	58.94	.09	7212	866	0	14.3	-.3	84	319	33
	2	2	59.02	1.10	7212	866	0	3.5	-2.6	84	319	32
13	2	25	60.04	.37	7203	857	0	7.9	-2.7	84	320	34
14	2	26	60.38	.15	7200	854	0	28.4	-2.4	91	323	23
15	2	25	60.52	.37	7199	853	0	1.6	-3.2	84	321	30
16	2	26	60.86	.11	7196	850	0	26.6	0.0	84	321	27
	2	2	60.96	.39	7196	850	0	4.0	-3.2	77	319	36
17	2	21	61.32	.26	7193	847	0	-1.4	-2.7	98	321	31
	2	25	61.56	.32	7190	844	0	.5	.2	84	321	31
	2	26	61.86	.26	7188	842	0	28.1	.5	119	324	22
18	8	25	62.10	.39	7186	840	0	-7.7	-.2	105	320	32
	8	2	62.46	.86	7183	837	0	20.0	-3.7	105	320	31
19	8	6	63.26	.06	7176	830	0	28.5	-2.7	63	324	22
	8	2	63.32	.95	7176	830	0	24.5	-1.1	70	321	30
	8	12	64.20	.37	7168	822	0	22.6	-2.4	63	321	30
	8	20	64.54	0.00	7166	820	0	21.6	-1.0	63	321	31
	8	12	64.54	.24	7166	820	0	21.6	-1.0	63	321	31
	8	2	64.76	.52	7164	818	0	21.3	-3.2	98	322	25
20	8	12	65.24	.39	7160	814	0	20.7	.8	84	321	28
	8	2	65.60	.65	7157	811	0	28.1	-.5	105	322	24

TABLE 6 - Concluded

	MISS SEG	FLT COND	PANEL TIME	DELTA TIME	GROSS WEIGHT	MAIN FUEL	AUX FUEL	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
21	8	5	66.20	.06	7152	806	0	25.2	-.8	105	322	27
	8	2	66.26	1.18	7151	805	0	26.8	-3.4	105	323	21
22	8	26	67.36	.09	7142	796	0	21.2	-3.0	105	322	27
23	2	21	67.44	.32	7141	795	0	-5.8	-6.6	105	320	36
	8	25	67.74	.06	7139	793	0	-.8	-4.8	112	321	29
24	8	12	67.80	.37	7138	792	0	16.0	1.9	84	320	34
25	8	11	68.14	.39	7136	790	0	25.3	4.3	98	323	24
	8	2	68.50	.11	7133	787	0	27.4	0.0	84	322	23
26	8	11	68.60	.22	7132	786	0	23.4	-1.4	105	322	24
27	8	26	68.80	.17	7130	784	0	24.5	-1.9	91	322	24
28	8	25	68.96	.19	7129	783	0	.3	-3.8	98	321	30
	8	2	69.14	.43	7127	781	0	22.0	-1.8	91	321	28
	8	11	69.54	.24	7124	778	0	28.9	-2.6	105	322	26
	8	2	69.76	.67	7122	776	0	26.0	-2.6	105	322	24
29	8	5	70.38	.04	7117	771	0	26.1	.8	105	321	30
30	8	6	70.42	.09	7117	771	0	25.2	-3.2	133	324	19
	8	2	70.50	.17	7116	770	0	24.2	-2.7	112	321	25
31	8	7	70.66	.15	7115	769	0	18.9	-4.0	119	322	24
32	8	22	70.80	.22	7113	767	0	13.1	0.0	119	318	41
	4	29	71.00	6.34	7112	766	0	45.8	3.2	161	319	42
	1	2	76.90	.67	7062	716	0	4.8	-.5	-68	322	25
33	2	10	77.52	.17	7057	711	0	2.4	.3	-40	321	12
	2	2	77.68	.67	7056	710	0	13.3	1.0	-68	321	28
34	2	8	78.30	0.00	7051	705	0	2.9	1.6	-68	321	26
	1	2	78.30	2.34	7051	705	0	2.9	1.6	-68	321	26
35	2	4	80.48	.15	7033	687	0	3.5	-1.0	-26	320	12
	2	2	80.62	.37	7031	685	0	3.2	-1.8	-61	320	26
36	2	8	80.96	0.00	7029	683	0	3.5	-1.3	-61	321	25
	1	2	80.96	.71	7029	683	0	3.5	-1.3	-61	321	25
37	2	4	81.62	.13	7023	677	0	1.6	-.6	-26	320	13
	2	2	81.74	.41	7022	676	0	1.8	-.8	-68	320	27
	2	11	82.12	.34	7019	673	0	5.8	-.6	-47	320	30
	2	20	82.44	0.00	7016	670	0	-3.5	0.0	-26	321	29
38	2	11	82.44	.41	7016	670	0	-3.5	0.0	-26	321	29
	2	2	82.82	.41	7013	667	0	6.6	.3	-40	321	28
39	2	11	83.20	.39	7010	664	0	5.3	0.0	-19	320	31
	2	20	83.56	0.00	7007	661	0	-4.0	1.4	-12	320	32
	2	11	83.56	.30	7007	661	0	-4.0	1.4	-12	320	32
	2	2	83.84	1.14	7004	658	0	4.3	-.3	-26	320	32
	2	8	84.90	0.00	6996	650	0	5.3	.5	-54	322	24
	1	2	84.90	.69	6996	650	0	5.3	.5	-54	322	24
	2	4	85.54	.15	6990	644	0	1.6	-.2	-26	321	12
	2	2	85.68	.88	6989	643	0	4.3	-1.3	-54	320	27
40	2	30	86.50	.19	6982	636	0	5.8	0.0	1	319	34
	2	2	86.68	.67	6981	635	0	7.9	-1.3	22	320	31
41	2	12	87.30	.32	6976	630	0	7.2	-1.4	-47	320	28
	2	2	87.60	.75	6973	627	0	3.8	3.2	-40	320	29
42	2	11	88.30	.30	6967	621	0	10.4	3.2	-61	321	28
	2	2	88.58	1.01	6965	619	0	.6	-1.6	-47	321	28
43	2	22	89.52	.19	6957	611	0	7.9	-1.4	-40	320	30
	4	29	89.70	5.70	6956	610	0	20.2	-.8	8	321	30
	4	29	95.00	10.47	7561	1215	0	2.6	1.6	196	320	12
	2	2	104.74	.84	7480	1134	0	13.6	.6	91	320	29
	8	2	105.52	.75	7473	1127	0	17.5	-3.0	112	320	31
	8	5	106.22	.06	7468	1122	0	28.4	-1.9	105	320	28
	8	2	106.28	3.44	7467	1121	0	32.2	0.0	105	322	21
	8	5	109.48	.09	7440	1094	0	27.9	0.0	168	321	24
	8	6	109.56	.09	7440	1094	0	33.2	-3.4	154	323	19
	8	2	109.64	.28	7439	1093	0	28.1	-2.1	140	321	26
	8	26	109.90	.15	7437	1091	0	29.8	-.6	147	321	24
	2	2	110.04	1.66	7436	1090	0	0.0	-1.6	154	320	35
	2	22	111.58	.13	7423	1077	0	.6	-1.9	133	320	32
	4	29	111.70	44.86	7422	1076	0	27.3	-1.4	147	320	35
	4	9	153.42	0.00	7073	727	0	-1.1	-4.0	112	240	0

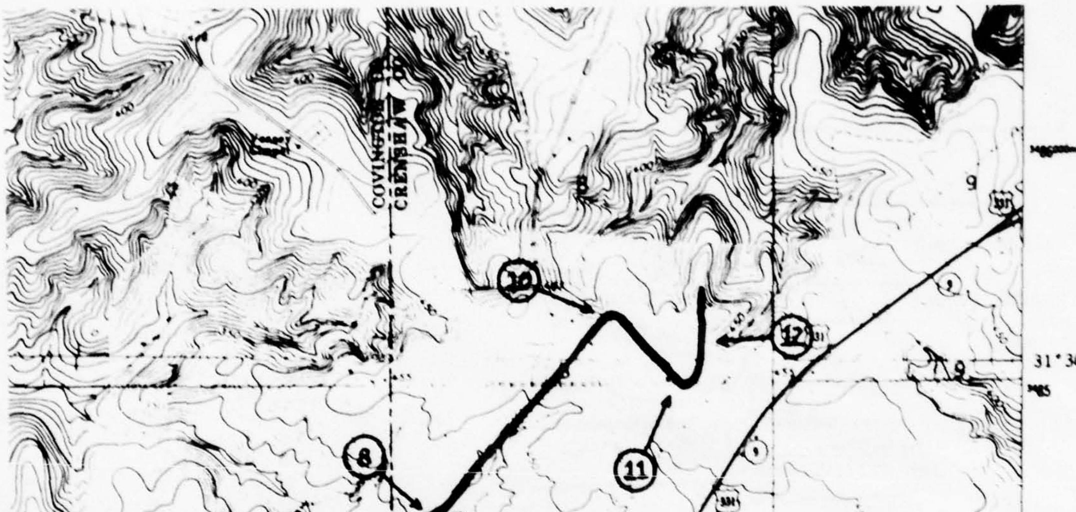

Figure 7. NOE Section 1 Position Plot for Typical NOE Profile in Figure 6

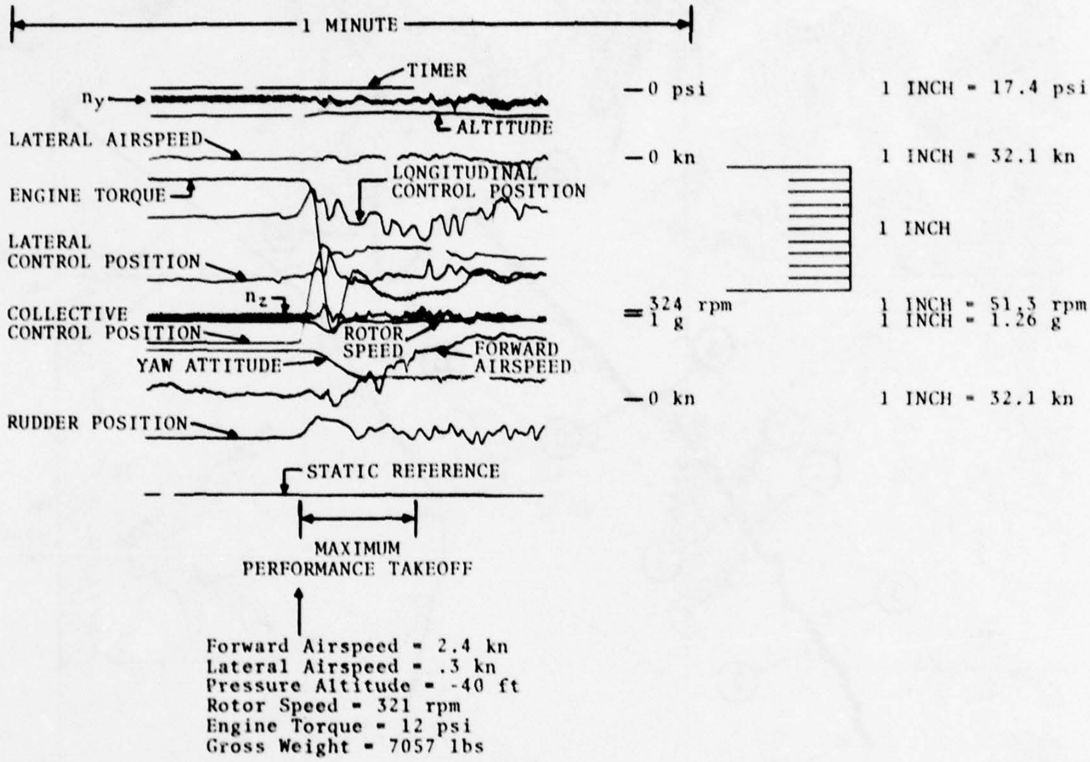

Figure 8. Oscillogram Section with Callouts to Illustrate a Typical Maximum Performance Takeoff

In Figure 9 for the second NOE segment, the helicopter flew approximately 13 minutes over the course. During this NOE segment, numerous turns, accelerations, and quick stops occurred. The following flight scenario for this segment was based on the position plot curve along with the keyed maneuvers in Figure 9.

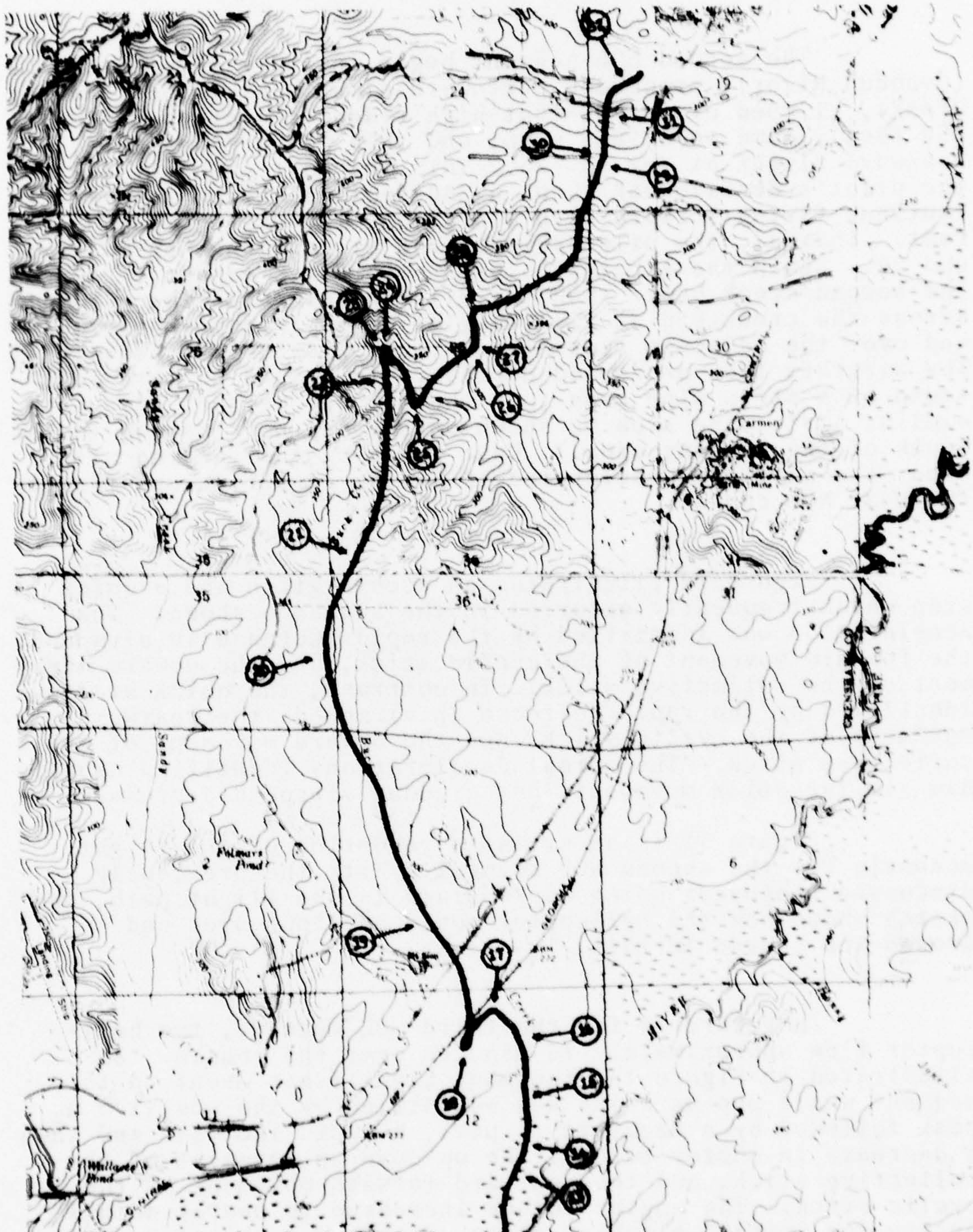

Figure 9. NOE Section 2 Position Plot for Typical NOE Profile in Figure 6

The second NOE segment began in a dry river bed (Conecuh River), proceeded northward along a creek bed (Buck Creek), climbed over a 50-foot-high ridge (elevations 350-400-350 feet), came to a full stop, and then performed some rearward flight at Key No. 23. This was most probably due to the pilot's decision at about a 340-foot elevation to not continue flying forward with elevations increasing to 400 feet. Instead, the pilot skirted the ridge along Key Nos. 25 and 26. Again the aircraft slowed before its exposure along the second creek bed. Then the pilot accelerated the aircraft across the creek bed at right angles (for minimum exposure) and over the adjacent ridge (elevations 320-370-320 feet). The aircraft then proceeded northward to a landing site just south of a strip mine area (not shown) near Key No. 32. (A similar strip mine area is shown on the map near Carmen to the south of the landing area.) Upon reaching the landing site area, the aircraft accelerated to cruise condition and flew to the next NOE course.

Figure 10 illustrates an acceleration and a quick stop which frequently occurred in the sequence shown. The acceleration was identified by the rapid increase in airspeed, the forward movement of the cyclic stick, and the upward movement of the collective stick. In contrast, the quick stop was identified by the rapid decrease in airspeed, the rearward movement of the cyclic stick, and the upward movement of the collective stick. The normal decelerations identified usually had similar stick movements but gradual airspeed decreases.

Figure 11 is an artist's rendering of the flight scenario for the second NOE segment. With the previously discussed maneuvers being appropriate to the flight path, the sketch shows how the helicopter would be flown over and around the course terrain.

In Figure 12 for the third NOE segment, the helicopter flew approximately 15 minutes over the course. As illustrated in Figure 13, the most significant event in this segment was a pop-up which was identified by the positive n_z peak followed by a negative n_z peak, a rapid increase and then a decrease in engine torque, the up-down-up movement of the collective stick, and the rearward-forward movement of the cyclic stick. The engine torque increased to nearly 46 psi during the initial climbing phase of this unmasking maneuver but quickly decreased to normal at the end of the climb.

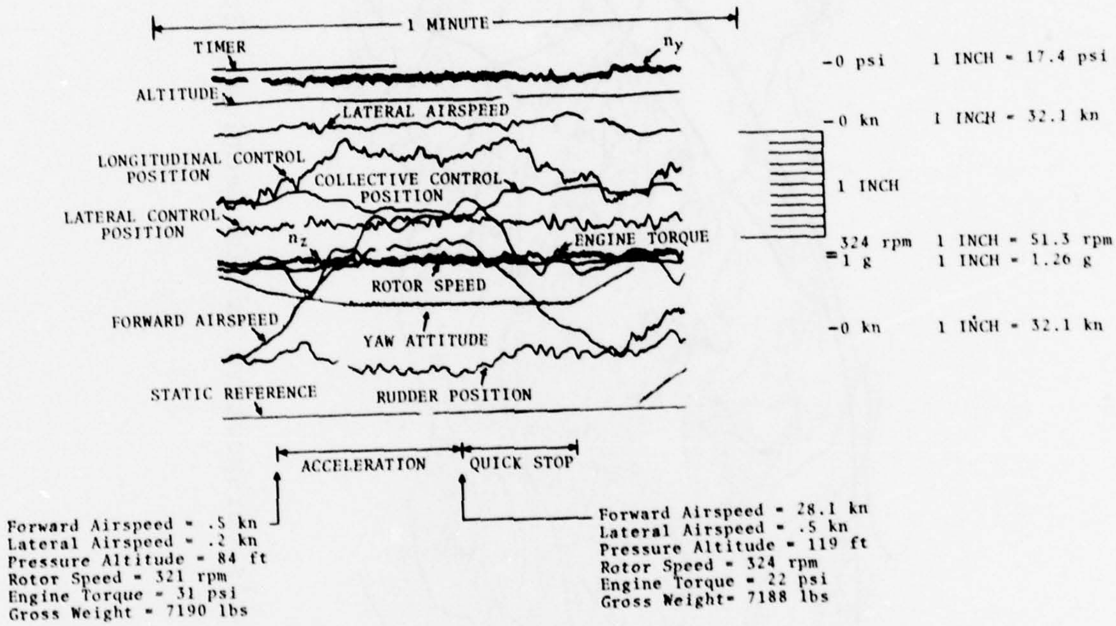

Figure 10. Oscillogram Section with Callouts to Illustrate a Typical Acceleration and Quick Stop

Figure 11. Artist's Perspective of NOE Section 2 Scenario

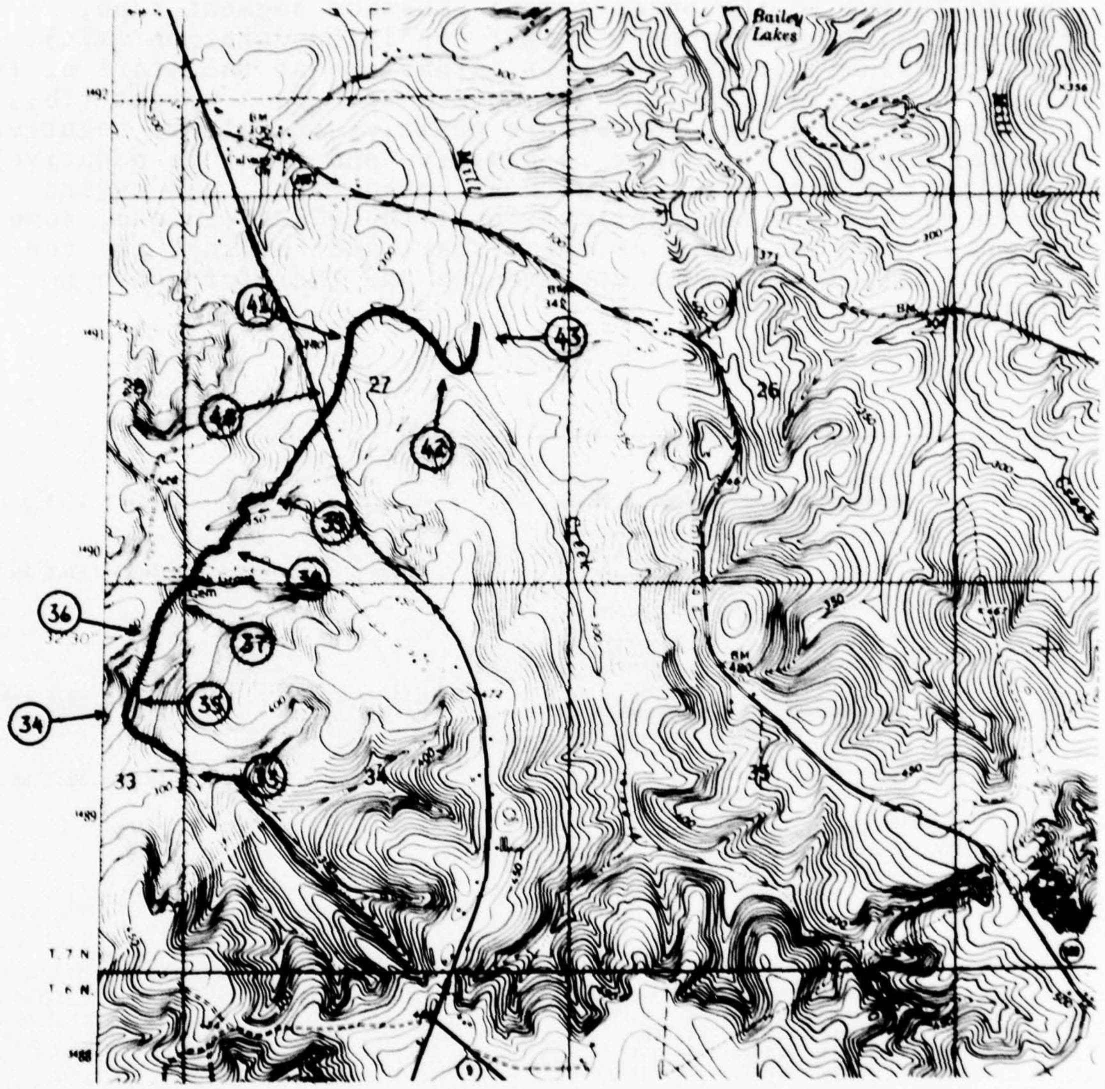

Figure 12. NOE Section 3 Position Plot for Typical NOE Profile in Figure 6

2.2.3 Flight Condition Occurrences

The FCR technique was used to identify and characterize each discrete flight condition on the oscillograms. With a grouping by mission segment type and then by flight condition category, Tables A-1, A-2, and A-3 in Appendix A detail each of the flight conditions identified. These tables summarize the data for the non-NOE, ground conditions, and hover/NOE mission segments, respectively. Each line in each table represents a discrete flight condition and lists

the following in the order given: mission segment type, flight condition category, flight condition duration (min), and the values for six aircraft parameters at the start of the flight condition. The six parameters are gross weight (lb), forward airspeed (kn, forward is positive and aft is negative), lateral airspeed (kn, left is positive and right is negative), pressure altitude (ft), main rotor speed (rpm), and engine torque (psi). In the application of the FCR technique, some flight conditions, such as rotor start and landing, are considered as instantaneous occurrences and therefore have no duration.

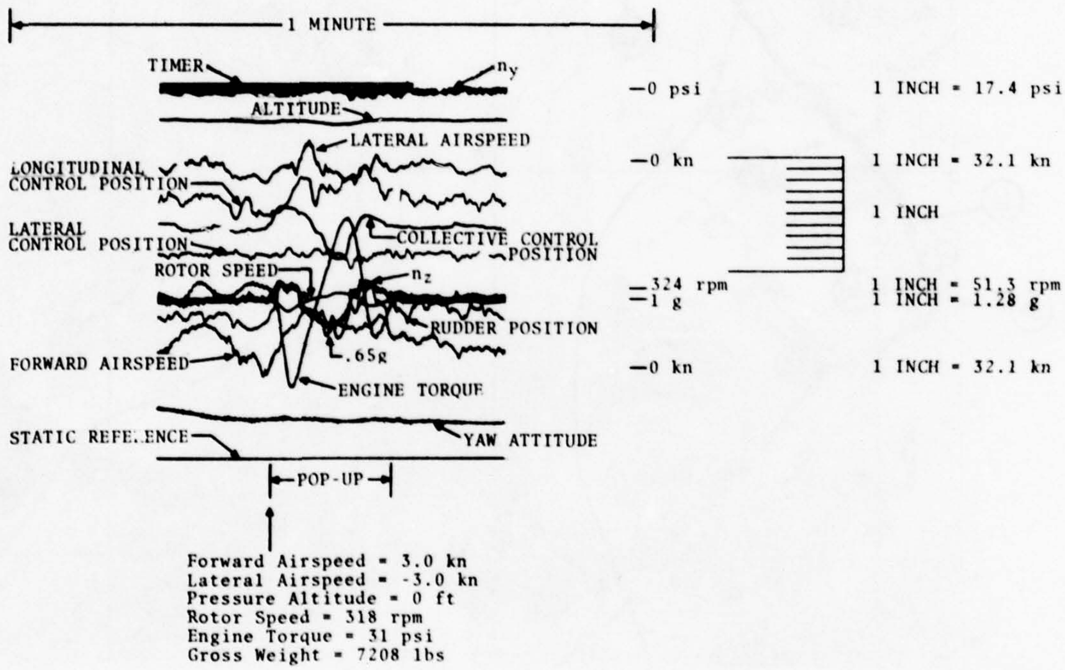

Figure 13. Oscillogram Section with Callouts to Illustrate a Typical Pop-up

As an example of the data format and content presented in Tables A-1, A-2 and A-3, Table 7 lists data for four flight conditions: rudder reversal, left sideward flight, right sideward flight, and flight condition separation.

TABLE 7. EXAMPLE OF FLIGHT CONDITION OCCURRENCE DATA

FLIGHT CONDITION: RUDDER REVERSAL

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
8	17	.06	7077	17.3	8.7	163	321	28
2	17	.08	7078	13.9	1.6	112	317	35
2	17	.06	7115	17.2	6.4	182	319	27
8	17	.04	7134	12.7	11.1	150	320	26
8	17	.04	7139	15.1	10.6	150	321	24
8	17	.11	7149	14.1	7.4	136	321	23
8	17	.09	7155	16.8	5.1	143	321	24
2	17	.06	7157	6.6	9.6	177	319	35
2	17	.08	7181	7.5	6.9	198	319	32
8	17	.06	7206	19.4	4.6	84	319	26
8	17	.06	7214	42.8	-7.1	154	320	19
8	17	.04	7236	16.8	1.6	0	317	32
2	17	.06	7448	-.5	6.6	349	319	30
2	17	.11	7579	1.9	10.4	412	319	35
2	17	.09	7583	1.8	9.5	377	319	35
2	17	.06	7591	.8	7.4	349	319	32
2	17	.12	7716	-1.3	-.6	-5	315	37

FLIGHT CONDITION: LEFT SIDEWARD FLIGHT

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
2	18	.34	6964	7.1	9.0	35	319	28
2	18	.31	7059	9.8	9.1	346	319	31
2	18	.27	7198	1.3	-.8	205	318	32
2	18	.35	7281	3.8	3.2	100	317	34
2	18	.32	7381	-3.8	4.6	293	319	32
2	18	.40	7534	7.1	5.0	93	316	33
2	18	.40	7580	5.0	6.7	30	315	34
2	18	.34	7582	.5	10.1	391	323	33
2	18	.32	7705	14.9	8.3	384	320	29
2	18	.25	7715	-8.2	1.4	-33	317	32

FLIGHT CONDITION: RIGHT SIDEWARD FLIGHT

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
2	19	.32	7197	-9.8	-1.8	105	317	31
2	19	.34	7259	-7.7	-6.6	59	318	32

FLIGHT CONDITION: FLIGHT CONDITION SEPARATION

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
8	20	0.00	6895	28.9	-2.6	468	318	19
8	20	0.00	6906	40.6	-1.9	238	323	16
8	20	0.00	6923	27.1	0.0	247	319	25
8	20	0.00	6968	30.3	3.0	355	321	20
8	20	0.00	6998	44.4	-.6	327	317	22
8	20	0.00	7002	30.0	-3.2	261	320	21
2	20	0.00	7007	-4.0	1.4	-12	320	32
8	20	0.00	7009	40.1	-7.7	295	322	11
8	20	0.00	7015	40.9	4.2	168	318	26
2	20	0.00	7016	-3.5	0.0	-26	321	29
2	20	0.00	7047	-6.7	-2.7	-45	319	33
2	20	0.00	7054	-6.7	-.8	179	317	29
8	20	0.00	7085	36.1	1.3	299	316	23
8	20	0.00	7166	21.6	-1.0	63	321	31
8	20	0.00	7228	19.1	.8	257	318	29
2	20	0.00	7244	-9.9	3.7	-6	316	32
8	20	0.00	7249	43.8	7.5	93	320	18

References 3 and 4 define the flight conditions. Since most conditions are self-explanatory, only the following need be clarified for this report: transient, deceleration, maximum performance takeoff, flight condition separation, pop-down, airspeed acceleration, begins-in-flight, ends-in-flight, non-NOE data, and pop-up. Transients are usually associated with rapid rotor speed and engine torque changes while the aircraft is on the ground. Of the eight such transients identified in this program, each was associated with the change in rotor speed from flight to ground idle values or vice versa. However, two transients, illustrated in Figure 14, were identified during flight. According to the altitude, engine torque, n_z, and collective traces in that figure, the first transient was a power-to-autorotation transition and the second an autorotation-to-power transition. Such transitions occurred only once in the data sample. Maximum performance takeoffs, airspeed accelerations, decelerations, and pop-ups are discussed in Section 2.2.2. Basically the opposite of pop-ups, pop-downs were rapid descents while the aircraft was hovering. As shown in Figure 15, a pop-down may be defined by a negative n_z peak followed by a positive one, a downward collective stick position followed by an upward one, and a decreased engine torque followed by an increased one. Flight condition separation, begins-in-flight, ends-in-flight, and non-NOE data were used only as computer processing aids. Flight condition separation was used to separate two or more identical flight conditions; begins-in-flight and ends-in-flight were used for those flights whose recordings did not begin with a rotor start or end with a rotor stop, respectively; and non-NOE data represent all data, both ground and flight, which were not associated with an NOE training operation.

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[3] Johnson, Raymond B., Jr., and Meyers, Ruth E., OPERATIONAL USE OF THE UH-1H HELICOPTERS IN ARCTIC ENVIRONMENT, Technology Incorporated; USAAMRDL Technical Report 74-65, Eustis Directorate, U.S. Army Air Mobility Research and Development Laboratory, Fort Eustis, Virginia, August 1974, AD A002603.

[4] Severyn, Thomas P., and Johnson, Raymond B., OPERATIONAL USE OF AIR FORCE UH-1 HELICOPTERS VOLUMES I-V, Technology Incorporated; WR-ALC/MME Technical Report 75-MME-008, Warner Robins Air Logistics Center, Robins Air Force Base, Georgia, January, March, and April 1976.

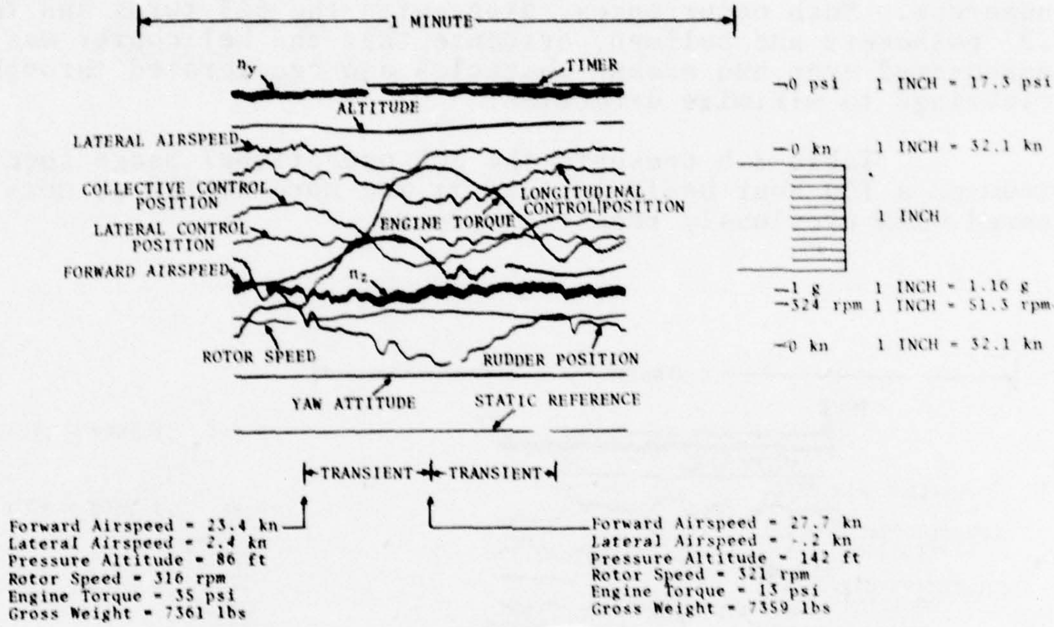

Figure 14. Oscillogram Section with Callouts to Illustrate an In-Flight Transient

As an operational usage spectrum for the 14.9 hours of processed data, Table 8.a lists for each flight condition the number of occurrences during both NOE and non-NOE operations and the average duration of the occurrences during NOE operations only. Of the 2235 flight conditions identified in this sample, only 38 percent were steady state. As expected, the helicopter maneuvered most of the time during NOE-type flights. The number of sideward and rearward flights performed was more than the number identified since these maneuvers were

frequently performed in conjunction with another maneuver, especially turns. Therefore, not all of these maneuvers were accounted for since by FCR definition only one flight condition can be identifed within a specific time span. Even though the airspeeds were generally below 40 knots, the accelerations, decelerations, and quick stops were relatively numerous. Such occurrences, along with the 555 turns and the 297 pushovers and pullups, evidence that the helicopter was maneuvered over and around obstacles and accelerated through clearings to minimize detection.

Table 8.b presents the NOE operational usage spectrum on a 100-hour basis so that it may more easily be compared with previously reported spectra.

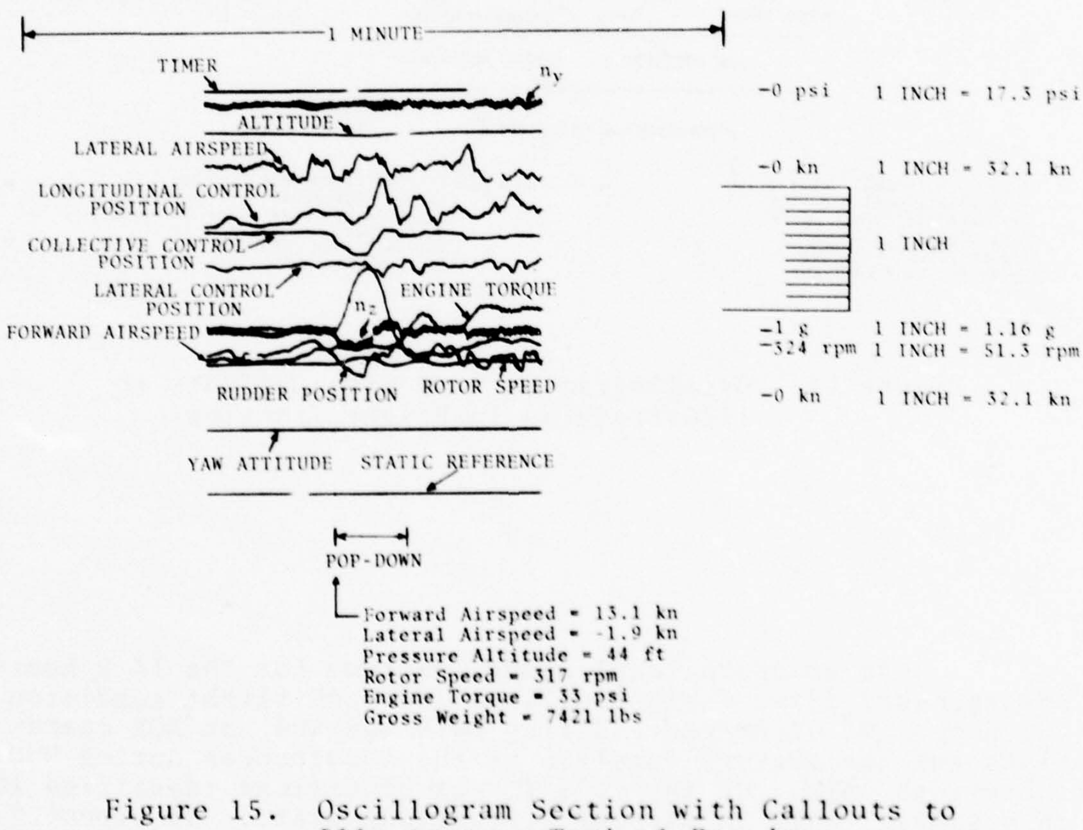

Figure 15. Oscillogram Section with Callouts to Illustrate a Typical Pop-down

TABLE 8. OPERATIONAL USAGE SPECTRUM

a. Collective Data

Mission Segment / Flight Condition	Flight Condition Time (min)	Number of Occurrences	Average Duration (sec)
Non-NOE - 33.5 hrs			
Rotor Start	0.0	11	0
Rotor Stop	0.0	11	0
Begins-in-Flight	0.0	1	0
Ends-in-Flight	0.0	1	0
Non-NOE Data	2010.2	63	1914
Total	2010.2	87	
NOE - 14.9 hrs			
Ground Conditions - 1.8 hrs			
Steady State	105.8	83	77
Transient	1.8	8	13
Total	107.6	91	
Hover/NOE - 13.1 hrs			
Steady State	508.3	855	36
Transient	0.4	2	13
Normal Takeoff	13.2	60	13
Collective Pushover	9.5	132	4
Collective Pullup	9.9	132	5
Deceleration	9.1	42	13
Touchdown	0.0	58	0
Max. Performance Takeoff	1.5	14	7
Left Turn	91.0	311	17
Right Turn	67.9	244	17
Cyclic Pushover	1.5	16	5
Cyclic Pullup	1.4	17	5
Longitudinal Reversal	0.1	3	3
Lateral Reversal	0.2	3	4
Rudder Reversal	1.2	17	4
Left Sideward Flight	3.3	10	20
Right Sideward Flight	0.7	2	20
Flight Condition Separation	0.0	47	0
Rearward Flight	24.5	56	26
Initiation of Ascent	5.7	35	10
Pop-Down	0.8	6	8
Airspeed Acceleration	20.2	72	17
Quick Stop	14.0	75	11
Pop-Up	4.8	26	11
Total	789.2	2235	

TABLE 8 - Concluded

b. NOE Data Normalized to a 100-Hour Basis

Mission Segment / Flight Condition	Flight Conditions Time (min)	Number of Occurrences
NOE - per 100 hrs		
Ground Conditions - 12.1 hrs		
Steady State	710.1	557
Transient	12.1	54
Total	722.2	611
Hover/NOE - 87.9 hrs		
Steady State	3411.4	5738
Transient	2.7	13
Normal Takeoff	88.6	403
Collective Pushover	63.8	886
Collective Pullup	66.4	886
Deceleration	61.1	282
Touchdown	0.0	389
Max. Performance Takeoff	10.1	94
Left Turn	610.7	2087
Right Turn	455.7	1638
Cyclic Pushover	10.1	107
Cyclic Pullup	9.4	114
Longitudinal Reversal	0.7	20
Lateral Reversal	1.3	20
Rudder Reversal	8.1	114
Left Sideward Flight	22.1	67
Right Sideward Flight	4.7	13
Flight Condition Separation	0.0	315
Rearward Flight	164.4	376
Initiation of Ascent	38.3	235
Pop-Down	5.4	40
Airspeed Acceleration	135.6	483
Quick Stop	94.0	503
Pop-Up	32.2	175
Total	5296.6	14998

2.2.4 Parameter Excursions

Since helicopters during NOE missions perform many transient maneuvers, some parameters were processed as peaking parameters (parameter values outside a threshold) and others as excursions (specific parameter value changes, either increasing or decreasing, within a specific time span). Exhaust gas temperature (EGT), rotor speed, vertical and longitudinal acceleration at the aircraft cg, and lateral acceleration at both the aircraft cg and the tailboom were processed as peaking parameters, while forward airspeed and engine torque were processed as excursions. Each of these is discussed in the following paragraphs.

Airspeed excursions were defined as specific forward airspeed changes, either increasing or decreasing, within a specific time span. The airspeed accelerations and decelerations had to be at rates greater than 2 and -2 knots per second, respectively, and produce airspeed changes greater than 10 knots. Table 9 lists the airspeed change and time-span criteria used to define the airspeed accelerations and decelerations. As listed in Table 10, 166 airspeed excursions were identified; of these excursions, 74 were accelerations and 92 were decelerations. Most of the excursions, 73 percent, had airspeed changes of 10 to 30 knots, while the remaining excursions consisted of airspeed changes from 30 to 50 knots. The large number of accelerations and decelerations evidence the dynamic performance of NOE missions. Also, the excursions occurred mainly during accelerations, initiations of ascent, and quick stops as would be expected. Eight flight conditions had both an acceleration and a deceleration. Most of these were pop-ups in which the airspeed change was very near the 10-knot minimum. Figure 10 shows two typical airspeed excursions; one occurred during an acceleration and the other during a quick stop.

TABLE 9. AIRSPEED EXCURSION CRITERIA

Category	Time (sec)	Airspeed Change (kn)
1	≤ 15	10-30
2	≤ 25	30-50

NOTE: Minimum acceleration/deceleration was ± 2 knot/sec

TABLE 10. AIRSPEED EXCURSION DATA

Flight Condition	Type of Excursion*	Flight Condition Length (seconds)	Number of Excursions
Acceleration	1-I	4	1
		8	1
		10	3
		11	5
		13	5
		14	7
		17	2
		18	1
		19	1
		22	1
		23	1
		29	1
Acceleration	2-I	13	2
		14	1
		18	1
		19	1
		20	1
		21	1
		22	2
		23	1
Initiation of Ascent	1-I	5	1
		7	2
		8	1
		9	1
		11	1
		16	1
		17	1
Initiation of Ascent	2-I	4	1
		5	1
		8	3
		9	2
		10	1
		11	1
		12	1
		13	2
		14	1
		16	1
Quick Stop	1-D	5	2
		7	5
		8	5
		9	11
		10	8
		11	6
		13	4
		14	2
		15	2
Quick Stop	2-D	10	3
		13	5
		14	2
		15	1
		16	5
		17	2
		19	1
		20	1
Deceleration	1-D	9	1
		10	2
		11	3
		17	2
Left Turn	1-D	16	1
		23	1
		25	1
Right Turn	1-D	17	1
Right Turn	1-I/1-D	32	1
Pop-Up	1-D	7	1
		10	1
		17	1
Pop-Up	1-I	10	2
		14	1
		16	1
Pop-Up	1-I/1-D	6	1
		7	1
		11	1
		13	1
		16	2
		18	1
Pop-Down	1-D	7	1
		8	1
Collective Pullup	1-D	7	1
Collective Pullup	1-I	5	1
Collective Pushover/ Pullup	1-D	7	1

* I - Increasing Airspeed, Acceleration
D - Decreasing Airspeed, Deceleration

Engine torque excursions were defined as specific torque changes, either increasing or decreasing, within a specific time span. Table 11 lists the criteria used to define torque excursions. Only 19 torque excursions, 9 increasing and 10 decreasing, were identified. Of these excursions, only two were identified in NOE flights. Both occurred during maximum performance takeoffs, one with a 2.8-second duration and the other with a 2.4-second duration; the latter is shown in Figure 8. The engine torque excursion was very transient with changes usually of only 10 to 15 psi. Of the 17 excursions in non-NOE flights, one was in a landing from hover, three were in a power-to-autorotation transition, three were in a maximum performance takeoff after autorotative landing, four were in an autorotative landing, and six were in a ground transient after autorotative landing.

TABLE 11. RAPID TORQUE EXCURSION CRITERIA

Time (seconds)	Torque Change (psi)
≤ 3	20 to 29
≤ 6	30 to 39
≤ 9	≥ 40

Of the six parameters processed as peaking parameters, only n_z and n_y had a significant number of peak occurrences. In the photopanel investigation of EGT for temperatures above 580°C and below 445°C, the peaks occurred during relatively steady-state periods and were so extreme that they were not considered as valid data. In any event, Table 12 lists the peaks identified along with their associated flight conditions. No longitudinal acceleration peak was greater than 0.1g. While the rotor speed occasionally exceeded the 324 rpm criterion, all peaks except one had durations less than 6 seconds. The one exception with a peak of 325 rpm occurred during steady-state NOE flight and lasted 11 seconds.

Table 13 lists the tailboom lateral acceleration peaks. Of the 26 peaks identified, 19 were positive (tailboom moving to the left) and 7 were negative. Thirteen of the peaks were caused by turns and rudder reversals as would be generally expected. Eight peaks occurred during steady

state. However, since wind gusts and the associated engine torque changes required numerous rudder and lateral inputs to keep the aircraft stabilized, there were a few lateral tail-boom peaks without an identifiable maneuver.

TABLE 12. EXHAUST GAS TEMPERATURE PEAKS

Peak Value (°C)	EGT Before Peak (°C)	EGT After Peak (°C)	Time to Peak (sec)	Time After Peak (sec)
1645	481	481	2	2
428	447	562	61	91
699	562	424	2	2
398	472	541	2	8
583	541	430	2	2
683	479	477	4	2
1020	477	489	8	2
1460	454	453	2	4
757	519	517	5	6
699	505	504	2	2
772	499	495	2	2
1114	495	499	2	4
212	499	502	2	2
344	515	516	2	2
707	515	516	2	9

TABLE 13. TAILBOOM LATERAL ACCELERATION PEAKS

Flight Condition	n_y Range -0.5 to -1.0	n_y Range 0.5 to 1.0
Steady State	3	5
Initiation of Ascent	0	1
Rearward Flight	0	1
Pop-Up	0	1
Rudder Reversal	0	5
Left Turn	3	3
Right Turn	1	1
Quick Stop	0	1
Acceleration	0	1

The vertical acceleration peaks are listed in Table 14. Seventy-three peaks were identified with turns accounting for 49 percent of them. Whereas turns in previous programs caused n_z peaks, those in the current NOE program were generally from hovers which did not produce peaks beyond the threshold criterion. On the other hand, Table 15 shows that 58 percent of the lateral acceleration peaks occurred during turns. While n_y peaks are not produced during a normal coordinated turn, they are generated during a hover turn, especially if the helicopter is pivoted about the tail rather than the cg.

In addition to the aforementioned maneuver-induced peaks, there were 29 gust-induced peaks. Six were in the 0.7 to 0.8 n_z range, 19 in the 1.2 to 1.3 n_z range, and 4 in the 1.3 to 1.4 n_z range. In general, both the maneuver-induced and the gust-induced peaks were not severe.

TABLE 14. MANEUVER N_Z PEAKS

	n_z Range																	
Flight Condition	Below	0.2	0.4	0.5	0.6	0.7	THR	1.2	1.3	1.4	1.5	1.6	1.7	1.8	2.0	2.2	2.4	Total
Collective Pushover						7												7
Collective Pull-Up								14	1									15
Left Turn								11	2	2	1							16
Right Turn								17	2	1								20
Pop-Down					1													1
Acceleration								2										2
Quick Stop						1		8										9
Pop-Up					1	1		1										3
Total					2	9		53	5	3	1							73

TABLE 15. MANEUVER N_Y PEAKS

	n_y Range															
Flight Condition	Below	-.40	-.35	-.30	-.25	-.20	-.15	THR	.10	.15	.20	.25	.30	.35	.40	Total
Steady State							1		2							3
Left Turn							3		5							8
Right Turn							5		1							6
Lateral Reversal							1		1							2
Rudder Reversal							2									2
Left Sideward Flight							1									1
Quick Stop									2							2
Total							13		11							24

2.3 Recording System Evaluation

As stated above, 20 different parameters were collectively monitored by the two oscillographs and another nine parameters were monitored by the photopanel. Of these 29 parameters, the following 10 have been considered as the minimum data set required to validly apply the FCR technique to the identification of the typical flight conditions during normal helicopter operational usage: (1) airspeed, (2) pressure altitude, (3) outside air temperature, (4) rotor speed, (5) engine torque, (6) vertical acceleration, (7) longitudinal cyclic stick position, (8) lateral cyclic stick position, (9) collective stick position, and (10) rudder pedal position (Reference 3). However, to identify the flight conditions typical of NOE missions, the foregoing 10 parameters must be complemented with others. The additional parameters, such as pitch and yaw attitude, permit identifying the slower-speed NOE maneuvers. For example, pitch attitude aids the identification of quick stops, and yaw attitude is a good indicator of hover turns. In addition, terrain clearance is helpful in identifying pop-ups.

During the current program, the helicopter attitudes and the terrain clearance could not be monitored and recorded reliably because of instrumentation problems. Consequently, the questionable validity of some of the data precluded using these parameters consistently throughout the data editing. Nevertheless, these parameters remain essential among those selected for monitoring NOE-type maneuvers.

If the terrain clearance altitude were substituted for pressure altitude in Table 1, the resulting 12 parameters could have sufficed for the identification of most of the flight conditions. However, if such mission segments as ascent and descent are to be identified to produce an operational usage spectrum representing more than NOE operation and if density altitude is to be derived, the parameters should include OAT and pressure altitude.

Table 16 lists the recommended parameters to be monitored for the subsequent identification of the flight conditions typical of NOE missions. In addition, if helicopter flight path information is desired, a multi-heading instrument may be used to vector the aircraft's geographic positions from radio beams provided that the referenced radio stations remain the same throughout the flight-path tracking.

TABLE 16. OPTIMUM PARAMETERS FOR IDENTIFYING NOE MISSION PROFILES

Flight Condition	Terrain Clearance Altitude	Engine Torque	Lateral Airspeed	Collective Stick Position	Yaw Attitude	Vertical Acceleration	Rotor Speed	Longitudinal Cyclic Stick Position	Lateral Acceleration	Lateral Cyclic Stick Position	Rudder Position	Forward Airspeed	Pitch Attitude	Tailboom Lateral Acceleration	OAT	Pressure Altitude
Rotor Start							X								X	X
Steady State		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Transient		X					X								X	X
Normal Takeoff	X	X		X		X						X	X		X	X
Collective Pushover				X		X									X	X
Collective Pullup				X		X									X	X
Deceleration												X	X		X	X
Touchdown		X		X		X						X			X	X
Rotor Stop							X								X	X
Max. Performance Takeoff	X	X		X		X						X			X	X
Left Turn					X	X				X	X				X	X
Right Turn					X	X				X	X				X	X
Cyclic Pushover						X		X							X	X
Cyclic Pullup						X		X							X	X
Longitudinal Reversal						X		X							X	X
Lateral Reversal									X	X				X	X	X
Rudder Reversal									X		X			X	X	X
Left Sideward Flight			X						X	X		X		X	X	X
Right Sideward Flight			X						X	X		X		X	X	X
Rearward Flight								X				X			X	X
Initiation of Ascent		X		X				X				X			X	X
Pop-Down	X	X		X		X									X	X
Acceleration								X				X	X		X	X
Quick Stop				X				X				X	X		X	X
Pop-Up	X	X		X		X									X	X

3. CONCLUSIONS

The following are the more significant conclusions drawn from the data in the current NOE mission program:

(1) The operational usage spectrum for the current NOE mission program in terms of n_z data is relatively mild compared with those derived from other programs with the conventional mixture of mission types.

(2) During the NOE missions, most of the flight condition occurrences were maneuvers with very few steady-state conditions.

(3) NOE-type maneuvers can be positively identified with the FCR technique when the basic parameters monitored during conventional helicopter operational surveys are complemented by the pitch and yaw attitudes.

4. RECOMMENDATIONS

The following recommendations are proposed for future NOE mission programs where data acquisition is desired for usage definition:

(1) The sonic altimeter should be replaced by a reliable type of low-altitude sensing/recording system that is not affected by the helicopter environment of wind, noise, and vibration.

(2) The state-of-the-art in helicopter parameter monitoring should be advanced to permit the consistent recording of valid pitch and yaw attitude data.

(3) Whenever future NOE-monitoring programs require helicopter flight path information, a multi-heading instrument should be used to vector the aircraft's geographic positions from radio beams, but the referenced radio stations must remain the same throughout the flight-path tracking.

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APPENDIX A

INITIAL PARAMETER VALUES FOR EACH FLIGHT CONDITION OCCURRENCE DURING EACH MISSION SEGMENT TYPE

TABLE A-1. INITIAL PARAMETER VALUES FOR EACH FLIGHT CONDITION OCCURRENCE DURING THE NON-NOE MISSION SEGMENT

FLIGHT CONDITION: ROTOR START

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
4	1	0.00	7705	-2.1	3.4	45	244	0
4	1	0.00	7705	-1.8	1.3	186	241	0
4	1	0.00	7705	3.8	4.3	35	240	0
4	1	0.00	7705	4.3	.2	-17	241	0
4	1	0.00	7705	4.3	5.0	163	241	0
4	1	0.00	7705	5.5	-1.9	-19	241	0
4	1	0.00	7705	8.7	5.0	200	240	0
4	1	0.00	7905	-2.1	-1.9	-88	256	0
4	1	0.00	7905	-1.6	-1.4	-5	238	0
4	1	0.00	7905	-.2	5.1	279	245	0
4	1	0.00	7905	.5	.3	96	241	0

FLIGHT CONDITION: ROTOR STOP

4	9	0.00	6614	-.6	-.2	433	240	0
4	9	0.00	6614	3.2	2.9	63	240	0
4	9	0.00	6716	8.5	3.2	122	241	0
4	9	0.00	6755	8.2	1.3	247	240	0
4	9	0.00	6845	-4.0	1.3	349	244	6
4	9	0.00	6855	4.6	2.9	214	240	0
4	9	0.00	6974	-2.6	1.9	320	241	0
4	9	0.00	6976	2.9	3.2	273	245	0
4	9	0.00	6995	-2.6	-1.6	177	243	0
4	9	0.00	7025	2.4	-.2	29	238	4
4	9	0.00	7073	-1.1	-4.0	112	240	0

FLIGHT CONDITION: BEGINS-IN-FLIGHT

4	27	0.00	7705	4.3	2.2	161	321	10

FLIGHT CONDITION: ENDS-IN-FLIGHT

4	28	0.00	6998	.3	1.0	-5	319	29

FLIGHT CONDITION: NON-NOE DATA

4	29	40.07	6675	28.1	1.8	182	318	24
4	29	70.06	6774	18.4	-2.4	382	322	26
4	29	27.91	6843	20.7	-.2	475	315	30
4	29	41.87	6864	29.5	4.5	434	318	30
4	29	3.16	6868	24.0	1.1	107	323	27
4	29	25.17	6868	44.4	-3.4	289	319	29
4	29	27.88	6873	25.2	1.6	342	317	32
4	29	103.35	6895	42.8	.5	203	320	31
4	29	58.66	6909	38.0	1.6	233	318	30
4	29	92.35	6911	38.0	2.2	397	320	26
4	29	22.45	6927	43.9	-2.6	299	316	27
4	29	39.29	6933	35.7	1.0	56	319	29

TABLE A-1 - Concluded

FLIGHT CONDITION: NON-NOE DATA (CONTINUED)

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
4	29	16.17	6956	20.2	-.8	8	321	30
4	29	86.50	7000	21.0	5.0	17	321	28
4	29	4.73	7007	22.1	4.3	179	318	28
4	29	32.45	7013	21.8	-3.0	410	319	35
4	29	8.59	7032	22.8	1.1	404	317	28
4	29	5.87	7090	23.6	1.0	137	320	30
4	29	8.28	7101	28.1	.3	175	324	24
4	29	14.22	7101	30.8	2.2	70	318	28
4	29	6.34	7112	45.8	3.2	161	319	42
4	29	31.89	7118	44.2	-5.5	307	316	32
4	29	20.62	7119	45.2	.5	349	320	26
4	29	53.00	7129	40.7	7.2	200	319	28
4	29	4.05	7131	18.9	3.4	177	321	27
4	29	37.86	7133	19.1	1.3	51	319	27
4	29	36.48	7156	17.6	-2.9	328	320	30
4	29	9.33	7188	26.1	1.4	177	321	28
4	29	34.52	7193	24.5	1.9	44	317	33
4	29	36.55	7209	44.6	.5	64	321	28
4	29	4.42	7239	19.1	-1.0	128	318	34
4	29	4.96	7239	22.3	.6	66	320	31
4	29	5.96	7259	18.8	3.7	-19	321	32
4	29	3.58	7264	20.7	2.4	121	321	30
4	29	38.36	7268	43.6	-.5	257	315	27
4	29	6.58	7276	25.5	1.0	1	321	31
4	29	4.10	7294	38.5	5.1	321	319	25
4	29	16.58	7310	26.1	0.0	265	319	35
4	29	35.53	7320	19.9	-1.9	100	317	33
4	29	8.79	7370	14.6	-.8	179	320	33
4	29	14.28	7374	21.3	3.7	140	319	24
4	29	10.94	7401	22.8	.6	-54	320	31
4	29	10.43	7412	25.6	1.4	349	319	32
4	29	44.86	7422	27.3	-1.4	147	320	35
4	29	13.83	7476	22.6	.8	47	318	31
4	29	13.21	7520	31.7	4.3	334	315	28
4	29	72.65	7550	22.1	0.0	-47	322	30
4	29	5.47	7566	24.2	-1.1	-67	319	30
4	29	10.49	7615	22.8	1.1	-12	316	31
4	29	6.93	7656	25.8	.8	-47	316	35
4	29	45.69	7705	-2.1	3.4	45	244	0
4	29	64.91	7705	-1.8	1.3	186	241	0
4	29	48.88	7705	3.8	4.3	35	240	0
4	29	76.14	7705	4.3	.2	-17	241	0
4	29	59.57	7705	4.3	2.2	161	321	10
4	29	96.10	7705	4.3	5.0	163	241	0
4	29	39.01	7705	5.5	-1.9	-19	241	0
4	29	77.18	7705	8.7	5.0	200	240	0
4	29	3.09	7791	27.7	2.9	159	317	27
4	29	26.58	7905	-2.1	-1.9	-88	256	0
4	29	49.70	7905	-1.6	-1.4	-5	238	0
4	29	52.40	7905	-.2	5.1	279	245	0
4	29	39.32	7905	.5	.3	96	241	0

TABLE A-2. INITIAL PARAMETER VALUES FOR EACH FLIGHT CONDITION OCCURRENCE DURING THE GROUND CONDITIONS MISSION SEGMENT

FLIGHT CONDITION: STEADY STATE

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
1	2	2.42	6890	-.2	-2.7	71	322	24
1	2	.45	6927	.8	1.1	57	322	26
1	2	.69	6996	5.3	.5	-54	322	24
1	2	.74	7017	5.5	6.7	123	318	27
1	2	.95	7027	2.1	2.9	-87	322	26
1	2	.71	7029	3.5	-1.3	-61	321	25
1	2	1.74	7033	-2.6	-.5	229	318	22
1	2	.80	7040	2.7	2.7	144	318	26
1	2	2.34	7051	2.9	1.6	-68	321	26
1	2	.67	7062	4.8	-.5	-68	322	25
1	2	.75	7065	-1.3	4.5	-45	321	11
1	2	1.01	7069	5.0	.3	137	318	26
1	2	2.46	7086	-1.1	1.3	-38	264	8
1	2	.26	7090	-2.7	6.3	-80	322	26
1	2	.28	7097	-2.7	-.5	109	321	26
1	2	1.52	7099	-2.4	-2.2	383	316	25
1	2	.71	7110	3.7	1.1	69	322	25
1	2	.54	7112	6.3	6.4	-80	321	26
1	2	1.47	7124	4.5	3.8	-75	319	27
1	2	1.57	7148	3.0	.8	85	321	27
1	2	.84	7156	3.7	1.9	-34	317	11
1	2	1.16	7166	.8	2.1	-27	267	8
1	2	.25	7171	3.5	1.8	-75	319	26
1	2	.62	7181	2.6	-2.4	85	322	25
1	2	2.37	7220	3.7	-.2	104	323	23
1	2	1.33	7234	4.0	-1.9	-75	318	26
1	2	.23	7238	4.5	1.9	107	321	27
1	2	.65	7251	-1.0	5.3	-24	321	26
1	2	1.49	7275	5.1	.2	-82	319	25
1	2	.11	7280	1.6	1.4	-19	320	13
1	2	.72	7282	3.8	.5	86	323	16
1	2	3.14	7306	2.7	.2	-26	273	8
1	2	4.97	7308	1.1	-2.9	86	320	26
1	2	.34	7308	4.3	1.8	-82	320	25
1	2	.43	7318	5.0	2.9	202	320	26
1	2	1.66	7321	4.5	1.0	-96	323	25
1	2	1.55	7351	4.8	.3	-96	323	25
1	2	1.88	7352	.5	4.8	59	320	27
1	2	.32	7356	1.6	.2	-89	323	26
1	2	2.72	7362	5.9	3.4	86	320	27
1	2	.43	7370	5.8	-1.0	66	321	24
1	2	.60	7374	3.2	-1.1	-96	323	26
1	2	1.73	7375	-2.4	6.3	223	321	27
1	2	.14	7375	2.2	4.6	100	319	29
1	2	.65	7385	2.7	6.7	-27	318	26
1	2	.62	7402	2.2	-1.4	-109	322	26
1	2	.87	7423	3.8	4.2	116	320	26
1	2	1.09	7429	2.4	5.5	216	319	29
1	2	1.28	7430	-4.2	2.6	-20	319	25
1	2	2.50	7433	0.0	-2.2	-89	322	26
1	2	.73	7457	-1.4	5.5	335	320	27
1	2	1.24	7459	2.1	-1.9	-27	319	27
1	2	1.44	7464	3.2	1.4	116	320	26
1	2	.45	7482	3.7	1.1	61	318	12
1	2	.08	7483	1.4	2.7	116	321	26

TABLE A-2 - Concluded

FLIGHT CONDITION: STEADY STATE (CONTINUED)

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
1	2	.64	7484	2.7	4.6	328	320	27
1	2	.49	7487	.5	2.2	75	275	6
1	2	1.28	7498	3.7	1.1	19	319	27
1	2	9.91	7508	-1.4	-2.7	-68	323	25
1	2	.42	7534	2.9	-1.8	-75	323	24
1	2	3.03	7543	-.3	3.8	342	320	28
1	2	2.68	7547	4.5	-1.1	26	319	26
1	2	1.43	7576	2.6	-.2	19	320	26
1	2	2.00	7588	.8	-3.7	-123	319	27
1	2	.21	7589	2.4	6.7	328	321	27
1	2	.21	7600	3.4	5.3	328	320	29
1	2	.21	7603	1.9	2.6	12	319	26
1	2	.83	7611	3.0	2.1	328	321	27
1	2	.21	7624	-2.6	.8	-144	319	27
1	2	.87	7627	-.6	1.1	-74	318	27
1	2	9.40	7630	1.9	-1.4	-89	323	25
1	2	.15	7647	.5	.2	-144	319	28
1	2	1.00	7657	1.0	.2	328	320	28
1	2	.68	7664	-.3	-2.4	-82	323	26
1	2	.94	7664	4.6	-1.6	-144	320	27
1	2	1.81	7677	2.2	1.3	-47	317	28
1	2	.54	7694	-1.0	1.6	-75	323	22
1	2	.17	7698	-.8	-3.2	-47	318	25
1	2	1.35	7701	1.1	5.6	342	320	29
1	2	1.39	7722	5.5	3.2	335	321	26
1	2	.25	7728	2.7	1.3	-67	317	29
1	2	.23	7740	-1.4	1.3	-40	318	24
1	2	.79	7740	-.3	-1.8	-74	318	27

FLIGHT CONDITION: TRANSIENT

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
1	3	.17	7066	9.6	4.3	-45	262	10
1	3	.32	7088	-2.7	4.0	-45	320	8
1	3	.15	7157	4.2	.8	-13	272	8
1	3	.32	7169	1.3	1.9	-34	318	10
1	3	.19	7281	2.4	1.6	-19	273	10
1	3	.28	7308	2.7	.3	-33	321	13
1	3	.17	7483	1.1	.5	75	261	8
1	3	.17	7488	1.3	2.1	68	319	12

TABLE A-3. INITIAL PARAMETER VALUES FOR EACH FLIGHT CONDITION OCCURRENCE DURING THE HOVER AND NOE MISSION SEGMENTS

FLIGHT CONDITION: STEADY STATE

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
2	2	.11	6679	14.6	-4.2	126	316	27
8	2	.19	6685	38.6	7.4	203	317	21
8	2	.08	6686	37.8	.8	203	320	13
8	2	.44	6690	43.6	11.5	323	320	13
8	2	.13	6693	31.6	2.2	175	316	29
8	2	.42	6696	24.4	3.2	161	317	26
8	2	.27	6700	2.7	7.5	161	316	28
8	2	1.24	6715	17.5	-.5	84	315	31
8	2	2.44	6736	15.7	-.3	98	319	24
8	2	4.31	6773	12.5	-2.6	49	316	31
2	2	.53	6778	9.6	-1.0	42	316	29
2	2	.99	6784	15.5	1.1	318	321	27
8	2	.48	6784	24.5	-3.0	84	317	29
8	2	.27	6787	14.4	1.0	42	317	28
8	2	.78	6795	25.8	7.1	56	319	23
8	2	1.30	6796	44.4	3.4	276	323	18
8	2	.58	6801	44.4	3.0	261	322	21
2	2	.45	6808	10.4	.6	240	320	31
8	2	2.00	6813	19.7	2.9	21	319	24
8	2	.19	6817	11.7	2.6	7	316	30
8	2	1.92	6825	15.5	-1.8	261	321	25
8	2	.78	6825	21.6	-1.6	28	319	22
2	2	.81	6832	6.4	5.0	233	320	30
2	2	.19	6835	14.1	4.0	247	320	30
8	2	1.60	6839	20.2	5.1	35	316	28
8	2	.10	6840	43.9	7.5	297	324	20
8	2	.17	6843	31.3	-4.8	318	322	20
2	2	.72	6850	6.6	-.2	468	316	30
8	2	.13	6855	9.5	1.1	447	314	32
8	2	2.23	6858	18.4	3.4	-6	317	31
8	2	.37	6860	27.6	-.5	468	316	24
8	2	.15	6866	30.5	7.7	441	321	20
8	2	.50	6867	21.3	3.0	546	315	24
2	2	.12	6869	.2	5.8	50	321	30
8	2	.51	6873	37.8	10.9	419	321	20
8	2	.55	6875	7.5	-1.3	212	319	29
8	2	.06	6875	25.5	0.0	363	318	25
8	2	.11	6875	32.2	1.9	482	316	22
8	2	.20	6877	30.0	1.0	489	318	18
8	2	.09	6878	28.1	1.4	475	316	24
8	2	.25	6879	26.1	-5.3	254	322	19
8	2	.18	6881	9.9	-2.6	226	319	30
8	2	2.97	6883	19.6	0.0	14	320	22
8	2	.95	6883	31.3	2.9	392	317	27
8	2	.27	6885	35.7	-5.0	240	321	20
8	2	1.37	6886	22.0	6.1	342	320	26
8	2	.46	6888	14.4	.5	-20	317	28
8	2	.11	6888	25.6	6.7	335	320	24
8	2	.50	6888	29.5	2.4	399	319	22
8	2	1.22	6889	30.3	-.2	447	318	17
8	2	.27	6889	33.3	-1.8	247	320	25
8	2	.11	6891	24.8	1.1	433	315	26
2	2	.23	6893	7.9	-.5	219	317	33
8	2	.47	6895	25.0	1.0	314	321	22
8	2	1.24	6900	26.9	1.1	349	318	24

TABLE A-3 - Continued

FLIGHT CONDITION: STEADY STATE (CONTINUED)

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
8	2	.48	6901	24.8	1.1	482	316	23
2	2	1.70	6904	3.4	3.0	99	321	31
8	2	.47	6904	37.8	-.5	224	323	18
8	2	1.89	6906	13.0	-2.4	-13	318	28
8	2	.53	6908	27.9	-5.3	247	321	19
2	2	.58	6912	.2	5.6	99	319	35
8	2	.59	6912	17.5	0.0	-6	319	25
8	2	.37	6912	26.8	1.4	511	317	22
8	2	.45	6912	38.8	-2.6	238	323	18
8	2	.59	6913	19.1	1.9	261	320	25
8	2	.59	6914	36.2	-1.3	268	320	21
8	2	.12	6917	17.0	-3.2	254	319	27
8	2	.36	6917	40.7	-1.3	280	323	18
8	2	.43	6918	16.2	1.3	461	316	27
8	2	1.84	6918	31.7	3.2	356	318	24
8	2	.63	6918	32.7	3.8	313	321	20
2	2	.11	6919	6.6	2.6	461	314	31
8	2	2.48	6919	13.3	3.4	272	321	26
8	2	.27	6920	37.5	-5.9	296	321	18
2	2	.52	6921	4.8	1.9	64	320	28
8	2	.17	6921	37.0	-.5	301	323	18
2	2	.09	6922	8.5	1.6	461	315	30
8	2	1.47	6925	18.0	3.2	-34	316	30
8	2	.82	6925	32.5	-1.1	289	321	21
8	2	.13	6926	26.0	1.4	461	317	23
8	2	.14	6926	26.6	-.6	219	319	29
8	2	.60	6927	18.1	7.4	272	319	29
8	2	.06	6927	27.9	-.5	219	321	21
8	2	.36	6927	42.8	-.2	329	323	18
8	2	.25	6928	20.4	-.5	0	320	22
8	2	.45	6929	15.7	-1.8	304	319	28
8	2	.83	6929	30.5	1.8	299	321	20
8	2	.17	6930	21.3	1.3	285	315	25
8	2	.14	6930	22.9	.2	205	319	27
8	2	.11	6930	39.4	-1.8	327	322	16
2	2	.48	6931	18.0	-1.9	78	322	28
8	2	.11	6931	18.4	6.1	272	319	30
8	2	.07	6931	22.1	1.3	433	317	23
2	2	.10	6933	-.3	.3	78	321	29
2	2	.16	6933	8.3	1.4	296	319	30
8	2	.13	6933	34.5	1.0	440	317	20
8	2	.09	6934	24.5	3.0	293	319	27
8	2	.57	6934	37.3	-1.1	294	321	23
8	2	.14	6935	30.1	-2.9	329	322	21
8	2	.50	6935	31.3	3.2	306	320	21
8	2	.53	6935	34.9	-1.0	264	317	20
8	2	.08	6935	41.7	-4.8	56	321	18
2	2	.29	6937	0.0	.3	304	318	30
8	2	.30	6937	28.5	2.2	279	321	22
8	2	.39	6938	22.1	1.4	419	316	25
8	2	2.62	6940	26.0	5.5	314	318	25
8	2	.17	6940	28.2	1.9	342	321	22
8	2	.27	6940	30.5	-3.7	63	321	19
8	2	.19	6940	39.1	-4.0	322	324	18
2	2	.72	6941	9.3	2.6	184	317	36

FLIGHT CONDITION: STEADY STATE (CONTINUED)

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
2	2	1.07	6942	17.8	2.6	121	322	25
8	2	.57	6943	23.7	1.8	419	317	25
8	2	2.00	6944	11.4	-2.7	-34	319	28
8	2	.38	6944	14.6	-1.8	273	321	29
8	2	.65	6944	15.4	-.5	285	320	26
2	2	.16	6945	6.1	-.2	261	317	32
8	2	.11	6946	30.6	1.0	426	317	20
8	2	1.26	6946	36.7	-.8	313	318	18
8	2	.74	6947	23.2	1.9	70	319	27
8	2	.13	6948	33.3	-1.3	447	319	18
8	2	.13	6950	19.2	1.9	56	320	26
8	2	.13	6950	38.6	4.2	320	318	17
8	2	.10	6952	20.8	-3.4	212	319	27
8	2	.84	6952	37.5	4.6	289	321	21
8	2	.48	6954	15.4	1.3	390	317	27
8	2	.45	6955	41.8	5.9	336	323	15
8	2	.31	6956	30.8	-1.9	296	320	21
2	2	.11	6957	3.4	-5.1	348	313	31
8	2	.93	6957	38.8	2.1	383	322	16
2	2	.63	6959	-.2	-8.2	49	315	38
8	2	.47	6960	32.5	2.1	219	322	20
8	2	1.54	6961	14.9	.6	-27	318	28
8	2	.16	6961	24.7	1.9	226	321	22
2	2	.93	6962	12.3	1.0	362	316	30
8	2	2.44	6962	16.0	4.8	250	317	27
8	2	.13	6962	39.0	-2.1	334	318	16
8	2	.64	6962	43.3	5.9	365	323	20
2	2	.16	6963	1.9	4.2	170	320	29
8	2	.20	6963	25.6	2.1	390	321	22
8	2	.78	6964	32.7	.6	275	321	20
2	2	1.01	6965	.6	-1.6	-47	321	28
2	2	.66	6968	8.3	2.7	264	317	29
8	2	.63	6968	19.1	-5.9	21	317	29
2	2	1.68	6981	12.7	-2.4	-55	318	27
2	2	.72	6971	.3	7.7	49	317	32
2	2	.20	6971	15.7	-3.7	198	318	29
2	2	.67	6981	7.9	-1.3	22	320	31
8	2	.77	6972	38.3	-.2	264	317	21
2	2	.75	6973	3.8	3.2	-40	320	29
8	2	.02	6973	18.8	.3	112	318	26
8	2	.88	6974	34.1	.6	332	320	23
8	2	.43	6976	33.3	-2.7	191	321	21
8	2	.08	6978	34.9	9.5	84	317	28
8	2	.06	6979	31.6	2.2	77	319	21
8	2	.08	6979	31.7	-2.7	170	320	26
8	2	.37	6982	18.0	-1.0	149	320	26
8	2	2.06	6982	18.4	-1.3	273	322	26
8	2	1.48	6982	35.1	-1.0	341	321	17
8	2	1.11	6983	37.3	-.2	257	316	22
8	2	.65	6984	15.5	-1.0	318	319	26
2	2	.18	6986	14.1	-1.3	128	318	33
2	2	.36	6986	19.2	-2.7	-41	318	29
8	2	.63	6986	31.9	4.8	112	320	21
8	2	.27	6988	34.9	-5.8	311	320	23

TABLE A-3 - Continued

FLIGHT CONDITION: STEADY STATE (CONTINUED)

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
2	2	.88	6989	4.3	-1.3	-54	320	27
8	2	.29	6989	26.8	3.4	105	319	24
8	2	.62	6989	39.8	-2.9	336	323	22
8	2	.83	6990	41.2	-3.8	299	318	16
2	2	.12	6991	11.2	1.3	149	318	34
8	2	.65	6991	15.5	-1.9	142	321	27
8	2	.15	6991	31.9	1.6	147	321	16
8	2	.19	6995	8.0	-1.3	273	319	33
8	2	.11	6995	27.6	6.4	175	318	27
8	2	.30	6995	40.2	7.7	306	317	21
8	2	.09	6996	39.6	3.7	299	318	20
8	2	.19	6999	37.7	-2.4	329	325	15
2	2	.20	7000	7.1	6.3	135	319	29
8	2	1.25	7000	29.5	-4.2	261	319	22
8	2	.25	7001	41.7	1.3	295	321	13
8	2	.45	7003	30.9	.5	320	318	22
8	2	2.13	7003	35.1	4.6	320	321	22
2	2	1.14	7004	4.3	-.3	-26	320	32
2	2	.12	7004	12.3	.3	287	321	30
8	2	.37	7006	27.4	-1.1	240	319	25
2	2	.22	7007	2.9	4.5	270	317	35
2	2	.65	7007	3.5	2.4	-59	320	29
8	2	.38	7007	24.0	4.3	189	319	24
8	2	.43	7008	19.9	2.7	135	322	23
2	2	.13	7009	6.9	2.7	270	319	32
8	2	.11	7011	28.5	2.7	292	322	21
2	2	.41	7013	6.6	.3	-40	321	28
8	2	.80	7015	15.5	2.2	156	322	24
2	2	.97	7017	-4.8	6.4	-73	321	29
2	2	.18	7017	15.1	3.2	149	322	23
8	2	.48	7017	37.3	4.5	306	323	18
2	2	.17	7018	8.2	11.9	158	318	26
8	2	1.21	7018	12.5	2.7	259	321	29
2	2	1.70	7019	-3.4	-1.4	236	315	28
8	2	.19	7019	40.4	-1.1	154	319	23
2	2	.23	7021	2.2	7.1	149	319	31
2	2	.29	7021	14.4	0.0	290	319	30
8	2	.13	7021	26.1	4.6	147	319	21
2	2	.41	7022	1.8	-.8	-68	320	27
8	2	1.88	7022	14.9	-.5	205	318	30
8	2	.15	7022	31.6	4.8	263	321	22
2	2	.49	7025	14.1	.5	219	318	30
8	2	.37	7025	20.7	5.6	339	322	23
8	2	.45	7025	21.8	6.1	198	319	26
8	2	.04	7025	26.6	-4.3	168	321	20
8	2	.10	7027	27.7	3.7	233	318	23
8	2	.18	7028	40.6	11.1	240	321	16
8	2	.40	7029	22.4	1.0	133	320	23
8	2	.57	7029	37.3	1.3	270	323	15
8	2	.12	7029	43.9	10.3	219	322	17
2	2	1.26	7031	-7.1	-1.6	158	317	27
2	2	.37	7031	3.2	-1.8	-61	320	26
8	2	.18	7031	43.6	-5.8	275	322	15
2	2	.21	7033	-6.4	4.3	147	316	29

TABLE A-3 - Continued

FLIGHT CONDITION: STEADY STATE (CONTINUED)

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
8	2	.17	7034	.5	2.6	243	316	29
2	2	1.59	7034	20.0	3.2	336	322	26
8	2	.18	7034	20.5	1.9	289	319	27
2	2	1.01	7035	13.1	4.8	-31	321	27
8	2	1.18	7035	19.1	-.2	318	321	27
8	2	.70	7036	32.1	4.0	226	321	23
2	2	.33	7037	13.3	2.6	318	321	31
2	2	.57	7040	16.8	1.9	119	318	26
8	2	.65	7040	18.3	3.2	212	319	27
8	2	.45	7041	34.9	1.9	334	319	19
2	2	.39	7042	6.3	4.0	311	319	31
2	2	.23	7042	7.4	5.6	165	318	30
8	2	.93	7042	14.4	-1.0	235	319	29
8	2	.45	7042	17.5	7.4	226	320	27
2	2	.26	7044	2.4	3.0	-52	321	30
8	2	.30	7047	29.0	.5	285	317	22
8	2	.76	7048	31.6	4.6	147	320	21
8	2	.13	7049	25.8	3.2	299	316	22
2	2	1.19	7051	2.1	6.7	226	319	28
2	2	.33	7051	8.8	4.6	158	317	30
8	2	.93	7051	12.7	10.1	318	322	26
2	2	2.39	7053	-1.1	1.1	426	316	30
2	2	.67	7056	13.3	1.0	-68	321	28
8	2	.64	7056	15.2	4.6	325	321	26
2	2	.80	7057	-2.6	5.3	-87	321	27
8	2	.65	7057	24.7	6.3	219	322	23
8	2	1.53	7057	27.9	-1.3	233	320	23
8	2	1.00	7059	31.1	4.5	250	317	22
2	2	.35	7060	4.5	1.0	144	317	28
8	2	.18	7060	20.7	5.9	219	322	21
2	2	.54	7061	0.0	-.2	426	315	31
8	2	.33	7063	40.9	-.5	339	321	19
8	2	1.39	7064	27.7	4.6	126	319	24
8	2	.62	7064	34.0	1.4	236	317	21
8	2	.82	7066	9.9	1.6	219	319	30
2	2	.46	7068	-3.8	.2	412	315	31
8	2	.15	7069	30.3	.2	257	317	20
8	2	.13	7070	34.5	-3.5	264	317	20
8	2	.50	7071	19.1	4.2	112	320	24
8	2	.57	7071	26.1	3.7	240	319	23
2	2	.20	7072	-1.6	.2	404	315	30
8	2	1.23	7072	27.9	4.8	205	322	21
8	2	.43	7076	22.9	4.3	198	322	23
8	2	.41	7076	39.4	6.9	268	322	18
8	2	.53	7077	32.5	8.7	355	319	18
2	2	.82	7078	14.3	5.8	105	319	27
8	2	.06	7080	11.1	10.1	149	319	31
8	2	.25	7080	20.7	-1.0	133	318	27
8	2	2.05	7081	18.1	-2.6	261	320	30
2	2	1.02	7083	-2.1	-.3	383	316	26
8	2	.40	7083	32.4	-4.8	320	317	23
8	2	.32	7085	43.9	-3.5	182	320	25
2	2	.78	7086	-3.5	5.8	86	319	29
8	2	.32	7089	20.4	-6.9	210	318	26

TABLE A-3 - Continued

FLIGHT CONDITION: STEADY STATE (CONTINUED)

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
2	2	.25	7090	1.3	-4.8	100	321	30
8	2	.49	7090	32.5	3.8	264	318	18
2	2	.13	7091	-2.2	5.3	-80	321	30
2	2	.25	7092	-3.0	-5.9	196	319	29
2	2	.22	7094	0.0	.8	109	321	22
2	2	1.53	7094	11.4	-5.5	276	318	25
8	2	2.05	7094	12.2	1.4	339	318	30
2	2	.21	7095	14.4	-5.6	189	317	33
8	2	.83	7097	30.3	3.7	257	318	24
2	2	.39	7098	15.5	1.4	156	322	24
8	2	.41	7099	19.9	-4.0	360	320	24
2	2	.33	7100	.8	1.0	116	320	28
8	2	.48	7100	25.6	-6.1	309	319	21
2	2	.32	7101	7.5	7.2	313	316	26
8	2	.41	7103	19.2	1.9	198	320	28
2	2	.09	7104	7.2	2.7	69	321	28
8	2	.44	7104	34.0	-5.8	260	319	29
8	2	1.31	7105	19.7	2.2	268	319	29
8	2	.51	7106	24.0	-4.2	278	319	18
2	2	1.72	7107	2.9	6.6	-87	321	25
2	2	.59	7108	5.8	3.7	-68	318	25
8	2	.26	7108	31.3	-4.5	271	320	16
8	2	.46	7109	15.7	4.2	189	318	32
2	2	1.00	7110	-.6	1.1	102	321	27
2	2	.53	7110	.2	-1.6	198	319	36
2	2	.53	7113	12.8	.5	182	317	32
2	2	.38	7114	15.1	2.9	104	322	24
2	2	.12	7115	8.8	2.6	76	322	27
2	2	.24	7116	.3	-.2	137	320	31
8	2	.17	7116	24.2	-2.7	112	321	25
2	2	.27	7117	9.1	9.0	203	319	29
8	2	1.15	7118	39.0	5.8	292	319	17
2	2	.27	7121	6.7	3.7	240	320	31
2	2	.15	7122	-3.8	1.8	158	320	32
8	2	.67	7122	26.0	-2.6	105	322	24
8	2	.13	7122	35.4	8.7	334	319	16
2	2	.17	7124	0.0	1.8	90	321	28
8	2	.28	7125	26.6	5.8	299	317	23
2	2	.76	7126	13.5	-4.3	210	317	34
8	2	.43	7127	22.0	-1.8	91	321	28
2	2	.50	7128	5.1	8.0	-48	318	29
8	2	.21	7128	33.0	-.3	299	318	20
8	2	1.00	7128	38.2	-4.8	342	320	23
2	2	.33	7129	1.6	-.3	83	321	28
2	2	.54	7130	-.3	0.0	116	320	30
8	2	3.27	7130	22.9	1.4	268	320	25
8	2	.15	7131	37.8	9.3	164	320	21
8	2	.23	7131	41.0	3.4	362	319	17
2	2	.17	7133	3.8	3.4	99	319	28
8	2	.38	7133	25.2	-1.3	293	319	25
8	2	.11	7133	27.4	0.0	84	322	23
8	2	.65	7133	33.2	-5.9	182	318	24
8	2	.13	7134	9.5	12.3	143	319	28
8	2	.29	7134	20.4	1.6	254	319	28

TABLE A-3 - Continued

FLIGHT CONDITION: STEADY STATE (CONTINUED)

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
2	2	.28	7137	-2.7	1.4	116	319	32
2	2	.45	7137	.8	.3	83	321	29
8	2	.28	7137	28.1	-4.0	300	319	23
2	2	.07	7138	4.2	2.7	90	321	31
8	2	.54	7138	18.3	8.2	136	322	23
8	2	2.12	7138	45.2	-2.7	321	321	20
2	2	.48	7139	-1.3	-2.7	51	316	34
8	2	.49	7139	13.3	2.6	219	320	30
8	2	.09	7139	37.3	-3.5	341	320	18
8	2	.59	7140	39.3	-.3	168	320	16
2	2	1.39	7141	-4.2	-2.6	-20	318	27
2	2	.24	7141	3.8	2.2	76	322	28
2	2	.20	7141	7.5	2.7	198	319	34
2	2	.17	7144	-1.0	1.0	65	317	34
2	2	.54	7144	-.3	13.0	129	320	29
2	2	.21	7145	4.2	1.0	-61	318	22
8	2	.15	7146	20.8	6.4	150	321	22
2	2	.14	7148	-.5	4.8	219	318	34
2	2	.52	7148	8.2	-.3	111	321	31
8	2	.56	7149	33.5	7.1	349	321	22
8	2	1.18	7151	26.8	-3.4	105	323	21
2	2	1.39	7152	4.5	-.6	102	320	27
2	2	.10	7154	4.8	-2.1	212	317	37
8	2	.19	7154	14.3	2.7	150	319	28
8	2	.68	7154	33.3	4.0	285	319	19
8	2	1.87	7155	28.1	-1.6	112	319	27
2	2	1.03	7156	14.9	.2	149	322	30
2	2	.31	7157	3.8	-1.1	132	321	31
8	2	.22	7157	17.3	2.7	150	319	28
8	2	.65	7157	28.1	-.5	105	322	24
2	2	.14	7158	-.3	7.7	219	317	35
8	2	.96	7158	27.3	9.0	307	324	22
2	2	.29	7159	9.6	.3	299	320	31
2	2	1.17	7160	.5	5.1	51	316	35
8	2	.21	7160	22.9	4.2	321	322	23
8	2	.81	7162	28.7	1.9	243	317	26
2	2	1.07	7163	-1.3	.6	109	320	29
2	2	.26	7163	5.0	-8.2	143	320	27
8	2	.52	7164	21.3	-3.2	98	322	25
2	2	.15	7166	15.2	-.5	314	320	31
8	2	.48	7166	30.6	4.6	58	318	24
2	2	.76	7167	-2.9	10.1	128	320	31
8	2	1.43	7167	19.2	-2.9	70	318	32
8	2	3.31	7167	24.8	-4.0	321	320	23
2	2	.15	7168	9.0	4.3	307	319	31
8	2	.22	7168	28.1	3.4	143	322	18
8	2	.43	7168	35.1	-.8	243	319	19
2	2	.70	7170	.5	-.6	102	320	28
2	2	.06	7171	3.7	.8	-68	317	31
8	2	.17	7171	38.2	.6	243	319	19
8	2	1.20	7171	43.0	-5.5	335	322	20
2	2	.50	7173	2.7	.2	99	320	29
2	2	.09	7173	7.4	-.2	109	318	33
2	2	.44	7173	13.0	-3.2	77	316	37
8	2	.59	7173	19.9	2.6	212	320	26

TABLE A-3 - Continued

FLIGHT CONDITION: STEADY STATE (CONTINUED)

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
8	2	.23	7174	36.7	1.0	257	319	18
2	2	.15	7175	3.5	1.6	-61	318	32
8	2	.77	7175	26.1	1.1	44	318	26
2	2	1.14	7176	5.0	.2	111	321	31
8	2	.71	7176	19.9	9.3	164	319	27
8	2	.95	7176	24.5	-1.1	70	321	30
8	2	.12	7178	14.6	-1.6	30	318	28
2	2	.50	7179	5.8	2.1	285	320	30
8	2	.53	7179	14.4	3.7	205	319	30
2	2	.20	7180	6.3	5.6	191	318	36
2	2	.36	7180	14.4	3.0	-61	317	32
2	2	.12	7182	.6	0.0	44	316	35
2	2	.13	7183	-1.9	-.2	-48	317	31
8	2	.86	7183	20.0	-3.7	105	320	31
8	2	.56	7183	22.3	-.8	143	321	21
2	2	1.11	7184	17.2	-1.6	28	317	34
8	2	1.75	7184	19.6	1.1	370	318	28
8	2	1.06	7184	38.2	-1.8	313	320	16
8	2	.37	7185	7.5	2.2	306	320	31
2	2	.63	7186	6.6	3.7	198	320	29
2	2	.15	7187	1.1	-5.1	42	318	31
8	2	.08	7187	32.4	1.3	299	322	20
8	2	.65	7188	15.9	1.1	136	320	28
8	2	.28	7188	33.3	5.5	299	318	22
8	2	.83	7191	33.2	2.4	51	318	22
2	2	.86	7192	9.8	2.1	184	319	31
2	2	.80	7194	4.8	5.1	143	318	32
2	2	.82	7194	11.1	-7.4	98	318	30
8	2	.62	7194	22.8	1.1	299	321	25
8	2	.45	7194	38.3	-1.0	341	320	15
8	2	.17	7195	14.4	-3.0	314	319	30
2	2	1.26	7196	0.0	1.0	-41	319	28
2	2	.17	7196	1.0	5.6	16	316	33
2	2	1.02	7196	1.6	-.6	90	320	26
2	2	.39	7196	4.0	-3.2	77	319	36
2	2	.20	7196	12.5	1.3	191	318	34
2	2	.17	7198	.3	9.6	335	319	33
8	2	1.56	7199	8.5	.2	349	318	33
8	2	.45	7199	15.4	4.8	108	319	30
8	2	.72	7200	31.4	-1.8	313	319	21
2	2	.39	7201	.5	.8	205	318	34
8	2	.83	7201	18.0	5.5	23	317	31
8	2	.17	7201	18.9	1.6	150	321	24
2	2	.21	7203	-1.3	-3.5	370	318	34
2	2	.76	7205	18.0	8.3	98	317	29
8	2	.25	7205	26.8	5.5	51	318	23
8	2	.29	7206	36.7	5.6	285	322	22
2	2	.82	7207	8.5	-2.9	-20	318	32
2	2	.43	7207	12.0	.3	226	319	30
8	2	.23	7208	26.0	7.9	105	319	23
2	2	2.76	7209	7.4	1.6	149	319	31
8	2	.49	7210	18.0	-1.0	370	318	30
8	2	1.02	7211	32.4	6.9	65	320	21
2	2	1.10	7212	3.5	-2.6	84	319	32
8	2	.21	7212	10.7	5.3	278	321	29

TABLE A-3 - Continued

FLIGHT CONDITION: STEADY STATE (CONTINUED)

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
8	2	.15	7214	41.4	-4.8	497	321	14
2	2	1.74	7216	.8	.5	222	316	32
8	2	.37	7217	18.6	2.4	51	319	27
8	2	.13	7218	44.1	-3.7	532	319	25
8	2	.62	7219	18.1	4.6	236	321	27
8	2	.09	7219	18.1	5.1	278	317	26
8	2	.44	7219	23.2	-1.1	84	318	30
2	2	1.64	7222	2.9	-.2	-82	318	25
2	2	.33	7222	8.3	4.8	229	320	31
8	2	1.25	7222	25.5	.6	65	317	25
2	2	.69	7224	2.4	4.0	44	317	33
2	2	2.17	7226	5.8	-.8	149	319	34
8	2	.66	7226	17.8	2.4	271	317	30
8	2	.67	7226	24.0	5.0	0	318	28
8	2	.35	7226	31.1	7.2	100	319	18
8	2	.54	7228	32.5	3.7	271	322	24
8	2	.12	7229	15.5	-2.6	15	320	30
8	2	1.22	7230	14.4	-1.4	391	319	29
8	2	.25	7231	35.9	5.0	86	318	23
2	2	.30	7233	8.2	-.3	384	318	32
8	2	.17	7233	15.7	-2.2	243	318	32
8	2	.78	7234	21.5	6.6	63	320	23
2	2	1.13	7235	12.8	2.4	114	321	28
8	2	.46	7235	34.9	6.7	86	318	22
2	2	.15	7236	6.7	-3.0	412	317	31
8	2	.79	7236	14.4	-2.2	264	316	34
8	2	.06	7236	18.4	2.1	35	319	28
2	2	.28	7238	5.6	.6	257	316	34
2	2	.90	7241	12.0	00.	-20	317	32
8	2	.67	7243	33.2	7.4	114	319	18
2	2	1.64	7244	4.3	.2	65	316	34
2	2	.54	7245	-4.3	6.6	-17	319	29
2	2	.98	7247	2.2	3.4	80	319	31
8	2	.15	7247	41.2	9.9	93	320	19
8	2	1.28	7249	32.2	3.4	490	319	24
2	2	.17	7251	.2	6.6	285	316	31
2	2	.48	7251	10.6	-1.8	-61	318	33
8	2	1.66	7251	14.7	-3.2	21	318	29
8	2	.54	7251	30.0	4.8	114	319	20
8	2	1.84	7253	26.0	2.2	292	321	24
2	2	.30	7254	1.1	7.1	17	319	30
8	2	.08	7254	17.0	4.2	250	320	31
8	2	.49	7255	36.4	7.2	419	320	24
2	2	1.00	7257	4.8	-.8	86	318	33
2	2	.35	7257	15.5	6.6	278	320	30
2	2	.90	7258	13.3	1.6	21	318	30
8	2	.52	7258	32.5	.5	121	320	18
8	2	.71	7258	36.4	3.8	100	320	21
8	2	.32	7259	43.6	10.1	419	320	20
2	2	.34	7261	-4.0	2.4	-68	318	23
8	2	.17	7261	28.1	5.1	107	318	24
8	2	.15	7261	29.0	1.8	292	318	23
8	2	.10	7261	30.3	8.0	100	320	22
2	2	.17	7263	-2.1	10.6	31	319	30

TABLE A-3 - Continued

FLIGHT CONDITION: STEADY STATE (CONTINUED)

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
2	2	.82	7267	2.2	0.0	-61	322	27
2	2	1.19	7267	5.9	-6.6	135	319	29
2	2	.26	7269	6.6	6.3	24	318	27
8	2	.19	7269	28.4	4.0	142	318	23
2	2	.76	7270	5.6	-1.6	100	320	27
8	2	.09	7270	43.8	-4.0	271	316	20
2	2	.35	7271	-1.0	2.1	73	319	29
8	2	.53	7272	17.3	3.4	229	318	28
2	2	.62	7273	3.5	5.3	278	320	30
2	2	.95	7275	2.7	3.2	-68	320	31
2	2	.29	7276	1.1	-1.8	80	317	31
8	2	1.46	7277	16.8	3.2	100	319	26
8	2	.62	7278	23.9	3.4	229	318	25
2	2	.42	7280	11.4	.5	-19	320	30
8	2	1.17	7281	17.2	2.1	170	317	32
8	2	.70	7281	30.9	-2.1	271	321	22
8	2	.49	7283	26.3	1.8	236	319	24
8	2	.19	7283	43.9	-6.1	271	317	18
2	2	.46	7285	3.0	-3.2	93	317	34
2	2	.29	7285	4.5	2.1	86	319	29
8	2	.29	7286	29.8	2.4	149	318	23
2	2	.27	7287	5.5	1.3	107	319	34
8	2	.32	7288	20.7	-.2	229	318	25
8	2	.72	7288	39.0	-.3	-5	323	18
8	2	.15	7289	35.4	-5.1	264	315	24
8	2	.15	7291	21.2	-1.4	243	318	29
2	2	.54	7292	3.8	-1.3	93	317	33
8	2	.37	7292	31.9	.5	107	319	22
2	2	.61	7293	6.3	4.3	73	318	33
8	2	1.11	7293	15.7	-2.7	236	321	29
8	2	.19	7295	33.3	.8	121	319	21
8	2	.28	7296	32.4	-4.6	278	318	25
8	2	.57	7297	42.8	.6	257	316	19
2	2	.66	7298	17.6	3.2	250	320	28
2	2	.58	7299	5.5	.8	86	317	33
8	2	.16	7300	44.9	5.6	-33	323	20
2	2	3.47	7303	2.6	4.6	-82	319	24
8	2	.55	7303	26.9	-.3	299	318	20
8	2	.40	7303	43.6	-2.4	278	316	18
8	2	.09	7304	43.8	-2.4	278	315	22
2	2	.31	7305	9.6	.2	100	317	34
8	2	1.18	7305	13.8	-1.3	272	318	31
2	2	.15	7306	1.3	5.6	286	317	34
2	2	.12	7307	-1.0	0.0	121	319	28
8	2	.13	7307	43.9	-4.0	278	318	14
8	2	1.19	7308	26.1	3.4	107	318	24
8	2	.11	7308	42.2	6.6	285	319	20
2	2	.31	7310	5.5	.2	121	319	31
8	2	.17	7310	32.1	.5	107	317	28
8	2	1.12	7311	26.1	1.3	-33	322	22
8	2	.51	7312	43.6	-3.8	292	314	22
2	2	.30	7314	4.0	5.0	272	318	32
8	2	.56	7314	25.2	2.1	65	318	24
2	2	.35	7315	-3.7	4.5	121	319	32
8	2	.45	7315	40.4	6.6	250	319	20

TABLE A-3 - Continued

FLIGHT CONDITION: STEADY STATE (CONTINUED)

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
8	2	.08	7316	38.3	-3.4	100	320	20
2	2	2.13	7317	4.5	.6	86	319	32
8	2	.30	7317	39.4	-6.4	334	317	16
8	2	.09	7318	38.2	-1.8	327	317	15
2	2	.21	7319	1.9	2.2	-47	321	30
2	2	.55	7320	6.7	-.5	107	319	32
8	2	.46	7320	29.3	4.6	100	319	22
8	2	.45	7320	38.3	-5.0	426	321	19
2	2	.29	7322	-7.4	.8	107	318	33
8	2	.28	7322	20.7	1.0	-33	321	27
8	2	.19	7322	43.6	-.2	376	318	14
8	2	.24	7323	36.4	7.1	314	319	24
2	2	.33	7325	-5.6	1.3	114	319	30
2	2	.10	7326	0.0	1.4	86	317	31
2	2	.65	7326	8.5	2.1	-5	319	35
8	2	.33	7326	12.0	0.0	72	317	33
8	2	.32	7327	44.6	-1.1	306	318	27
2	2	.27	7328	11.9	-2.2	100	319	31
8	2	.19	7330	16.5	3.7	236	317	31
2	2	.90	7331	6.9	1.6	66	318	31
2	2	1.48	7334	6.1	-.5	86	316	35
2	2	.83	7336	3.7	-1.3	107	316	34
8	2	.15	7336	13.1	1.0	250	316	33
2	2	.41	7337	-2.9	3.8	73	317	31
8	2	.94	7337	43.0	7.7	397	316	24
2	2	1.44	7338	1.4	-2.4	-89	321	26
2	2	.13	7339	19.4	1.9	362	315	27
8	2	.10	7339	43.8	-1.9	135	320	17
8	2	.44	7339	39.3	-4.2	107	320	19
2	2	.68	7340	2.6	4.0	93	319	28
2	2	1.12	7341	8.3	3.4	58	316	32
2	2	2.76	7342	4.5	4.5	237	320	31
2	2	.11	7344	5.8	9.0	376	312	35
8	2	.55	7344	25.3	1.3	271	318	26
8	2	.48	7345	35.7	-3.0	79	318	24
8	2	.10	7347	33.8	-3.2	86	319	23
8	2	.15	7348	20.2	3.0	243	317	30
8	2	.94	7349	32.5	-.2	93	318	22
8	2	.19	7350	14.7	-.2	236	318	28
2	2	.11	7352	3.2	2.2	-82	320	32
8	2	.33	7352	33.2	-2.2	65	319	24
8	2	.38	7354	17.2	5.5	208	318	28
8	2	.60	7357	22.4	.2	65	317	28
8	2	.53	7357	33.5	-.8	468	316	19
8	2	.17	7358	13.9	-1.3	208	317	30
2	2	.86	7358	13.9	1.0	86	318	31
2	2	1.75	7359	3.5	3.4	195	319	29
2	2	.45	7359	6.6	.3	-68	322	32
8	2	1.56	7360	33.0	-1.3	72	318	21
8	2	.32	7363	14.3	-1.6	222	319	28
8	2	.55	7363	34.0	4.3	369	316	22
8	2	.40	7364	15.2	-2.9	58	316	33
8	2	.12	7365	36.1	-3.5	128	319	17
2	2	.90	7367	3.2	-.3	66	318	30
8	2	.21	7368	28.2	1.0	121	318	25

TABLE A-3 - Continued

FLIGHT CONDITION: STEADY STATE (CONTINUED)

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
2	2	.71	7369	2.9	-1.6	-102	320	30
2	2	1.50	7369	3.8	-.5	44	316	36
8	2	.50	7369	14.6	-.6	79	318	31
2	2	.89	7370	6.1	1.6	215	316	32
2	2	.21	7371	.2	3.0	72	316	35
2	2	1.43	7373	2.1	4.8	86	318	33
8	2	.30	7373	36.9	8.2	334	315	22
8	2	.71	7375	21.8	-2.9	121	317	28
8	2	.34	7376	40.6	8.8	362	317	17
2	2	.74	7378	-.5	8.0	130	320	28
2	2	.38	7378	1.1	2.9	279	318	36
2	2	.56	7378	7.1	1.1	-40	321	32
2	2	.44	7379	3.4	5.1	-41	317	28
8	2	.13	7381	25.2	1.6	285	314	27
8	2	.40	7383	26.6	2.9	142	318	24
8	2	.19	7383	28.5	6.4	292	316	20
8	2	.17	7385	27.7	6.6	285	315	23
2	2	.83	7386	-.2	3.4	137	320	33
2	2	1.54	7387	6.9	-.6	107	316	32
2	2	.39	7387	8.2	1.1	-68	321	33
8	2	.48	7389	21.0	1.4	149	317	27
2	2	.06	7391	19.2	1.8	151	323	28
8	2	.08	7391	21.0	2.4	177	315	31
2	2	.84	7392	-.8	5.3	-20	318	31
8	2	1.92	7392	32.5	-2.2	51	319	23
8	2	.19	7393	32.5	-1.0	184	318	20
8	2	.46	7393	32.9	3.5	128	317	26
2	2	.26	7395	.8	-.2	-102	321	27
2	2	.35	7398	7.4	3.0	144	319	33
8	2	1.60	7399	31.1	4.2	264	318	17
2	2	.67	7400	-.8	6.6	-27	317	30
2	2	1.33	7400	.8	3.0	244	318	36
8	2	.69	7400	36.5	.3	156	318	22
2	2	.25	7403	4.3	4.0	158	319	35
8	2	.36	7403	35.6	9.5	299	316	18
8	2	1.12	7404	38.0	6.7	51	320	20
8	2	.10	7405	29.0	1.4	191	318	25
8	2	.15	7405	34.0	8.0	264	316	21
8	2	1.21	7406	23.1	1.4	156	316	30
8	2	.31	7409	29.5	-.5	156	317	24
2	2	.76	7410	-.5	1.6	123	320	31
8	2	.36	7410	20.2	1.6	257	316	22
8	2	.48	7411	27.7	2.4	44	318	24
8	2	.50	7412	32.4	1.4	177	319	18
2	2	.12	7413	.3	2.7	116	319	27
2	2	1.66	7414	2.4	-1.9	-82	320	28
8	2	.47	7414	22.1	-1.4	243	318	20
2	2	1.77	7416	-6.3	2.7	-20	318	28
8	2	.23	7416	18.0	4.8	201	314	31
8	2	.81	7417	31.3	.5	128	318	24
2	2	1.26	7418	3.5	4.8	202	318	31
2	2	.51	7418	15.9	2.9	370	319	28
8	2	.56	7419	25.8	.6	100	317	26
2	2	.87	7421	12.2	.3	37	317	34
2	2	.19	7423	9.8	1.4	23	317	33

TABLE A-3 - Continued

FLIGHT CONDITION: STEADY STATE (CONTINUED)

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
2	2	.43	7424	-.6	1.9	363	318	34
8	2	.73	7426	25.6	2.2	128	317	27
2	2	.83	7429	6.4	0.0	165	320	34
8	2	.40	7429	32.5	-.5	51	319	22
8	2	.27	7429	43.4	8.0	142	319	20
8	2	.65	7431	35.7	-4.3	128	319	21
2	2	.30	7432	15.9	0.0	363	320	31
2	2	.50	7434	6.1	-1.8	0	317	34
2	2	.66	7434	9.8	6.3	237	320	31
2	2	1.66	7436	0.0	-1.6	154	320	35
2	2	.40	7436	.3	.3	-75	322	25
8	2	.40	7436	33.7	2.4	100	319	21
8	2	.77	7437	32.7	0.0	72	318	24
2	2	.33	7438	6.3	.6	151	319	33
8	2	.28	7439	28.1	-2.1	140	321	26
8	2	.23	7440	36.4	-5.9	107	320	17
2	2	.32	7441	1.8	-1.4	-6	317	30
2	2	.29	7441	11.5	-.3	86	317	32
2	2	.79	7443	3.8	-.6	363	318	33
8	2	.25	7445	39.1	8.3	93	321	20
2	2	1.07	7445	1.0	8.8	251	320	31
2	2	.11	7447	-1.0	-2.1	-27	318	28
2	2	.26	7447	-.3	7.5	328	322	28
8	2	.48	7447	32.2	4.5	107	318	21
2	2	.70	7449	5.3	1.9	109	319	27
2	2	.17	7450	-2.4	5.3	335	320	29
2	2	.75	7453	7.2	2.6	230	320	33
2	2	.13	7457	16.4	-.8	258	320	28
2	2	.21	7460	-.8	-.6	-13	318	29
2	2	.45	7461	-.8	5.6	342	319	29
8	2	1.33	7461	30.6	-.3	107	319	20
8	2	1.14	7462	28.9	-.6	114	319	25
2	2	.21	7464	-2.4	5.6	349	318	33
2	2	.23	7465	3.8	1.9	123	319	30
8	2	2.93	7465	30.3	1.0	79	319	23
2	2	.46	7466	14.7	1.8	-13	318	30
8	2	.50	7466	33.7	1.6	79	318	21
8	2	3.44	7467	32.2	0.0	105	322	21
8	2	.37	7468	38.6	-1.8	107	320	21
8	2	.19	7470	29.3	2.9	72	319	23
2	2	.25	7481	8.2	5.6	-20	316	32
8	2	.15	7472	25.8	1.9	79	318	30
2	2	.66	7473	16.2	-1.0	151	321	26
8	2	.75	7473	17.5	-3.0	112	320	31
8	2	.19	7473	25.3	2.4	72	317	26
2	2	1.18	7476	3.5	5.6	328	319	29
2	2	.11	7477	2.6	-.3	26	318	26
2	2	1.05	7477	15.5	3.8	7	319	27
8	2	.40	7479	14.1	4.0	65	319	27
2	2	.84	7480	13.6	.6	91	320	29
2	2	.64	7481	4.6	4.3	109	319	27
2	2	.12	7481	9.3	1.8	58	317	35
8	2	1.75	7482	27.7	1.9	65	318	24
8	2	.71	7483	18.0	1.4	30	317	30
8	2	.37	7487	15.1	3.4	44	317	28

TABLE A-3 - Continued

FLIGHT CONDITION: STEADY STATE (CONTINUED)

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
2	2	.75	7490	-1.1	7.4	398	319	33
2	2	.56	7492	6.4	.8	72	317	35
8	2	.71	7496	15.1	-1.8	58	316	33
8	2	1.35	7496	30.6	-1.8	51	320	19
8	2	.23	7499	34.0	2.2	37	320	21
2	2	.56	7500	.2	5.8	377	318	32
2	2	.85	7505	17.0	2.2	61	319	25
2	2	.23	7507	4.8	1.6	75	318	32
8	2	.65	7507	14.9	-3.5	16	318	32
8	2	1.44	7507	30.8	4.2	58	320	23
2	2	.23	7509	1.8	.3	72	316	34
2	2	.42	7511	4.0	-1.9	-19	322	31
2	2	.58	7512	8.3	-.2	23	316	33
8	2	.37	7514	18.1	4.0	58	317	30
2	2	.72	7515	2.2	1.4	61	319	29
2	2	1.11	7515	3.5	5.5	321	319	28
2	2	.35	7516	15.9	1.6	23	318	30
2	2	.31	7516	18.0	.5	58	317	32
8	2	.08	7517	15.9	.6	51	317	31
2	2	.06	7520	-.2	4.2	44	316	37
2	2	.42	7520	4.0	-2.2	-40	321	30
2	2	.53	7523	0.0	.6	40	319	27
8	2	.60	7524	16.2	5.0	72	318	28
8	2	.25	7529	15.5	5.8	86	317	31
2	2	.17	7530	0.0	5.1	93	315	36
2	2	.70	7530	1.1	-1.4	-75	321	27
2	2	.09	7534	4.0	0.0	-54	322	26
2	2	.12	7538	4.6	-2.7	-40	323	27
8	2	2.26	7538	43.6	-5.8	376	316	20
8	2	.11	7539	43.8	-2.1	390	317	18
2	2	.48	7541	16.5	2.9	93	317	29
2	2	.49	7544	.2	-.5	-47	322	28
8	2	.15	7546	25.3	1.8	100	318	24
2	2	.53	7548	10.1	3.4	384	319	34
8	2	.94	7548	43.1	-6.7	341	315	26
8	2	.15	7549	33.0	-1.6	320	318	21
2	2	.60	7552	-.8	3.4	68	317	35
8	2	.35	7552	22.0	1.9	86	318	24
2	2	.47	7554	1.6	2.2	-61	320	32
2	2	.53	7555	2.1	-1.3	370	318	35
8	2	.50	7557	27.7	2.1	72	319	21
2	2	.23	7558	7.4	.8	47	319	31
8	2	1.00	7560	40.6	3.4	285	318	21
2	2	.77	7561	4.5	-.5	-89	321	29
2	2	.45	7562	13.6	.6	384	319	33
2	2	.36	7564	4.6	1.0	40	319	30
8	2	.79	7564	19.9	1.9	44	319	24
8	2	.26	7565	42.8	-5.1	271	317	20
2	2	.56	7570	-1.1	1.1	363	318	38
8	2	1.02	7574	15.7	2.1	44	316	31
8	2	.28	7576	33.2	-2.4	278	315	25
2	2	.29	7577	6.6	1.8	23	316	34
2	2	.51	7579	4.6	8.7	377	319	33
2	2	.26	7585	3.4	3.4	321	320	30
8	2	.74	7585	32.1	9.0	306	317	20

TABLE A-3 - Continued

FLIGHT CONDITION: STEADY STATE (CONTINUED)

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
2	2	1.34	7586	1.9	1.3	26	320	28
8	2	.09	7586	29.8	7.4	285	318	22
2	2	.92	7588	10.7	3.4	37	318	31
2	2	.11	7590	-.6	7.5	335	319	35
2	2	.17	7590	3.0	3.2	285	315	34
2	2	.30	7591	-2.1	.5	47	318	29
2	2	.25	7593	15.4	.5	37	316	31
2	2	.79	7595	5.3	0.0	-130	319	32
8	2	.55	7597	33.8	8.8	348	316	26
2	2	.60	7598	5.6	2.1	328	317	32
2	2	.31	7599	5.0	1.6	-130	318	32
8	2	.21	7599	37.0	-1.9	376	318	16
2	2	1.06	7601	0.0	1.3	12	318	28
2	2	.33	7603	-.2	.8	-130	318	31
8	2	.34	7603	34.3	4.0	404	317	19
2	2	.38	7604	1.0	3.8	335	318	31
8	2	1.15	7614	28.1	2.1	320	316	25
2	2	.77	7618	-.6	9.0	405	319	35
8	2	.36	7618	39.1	3.7	327	317	24
2	2	.77	7621	2.2	4.8	-130	317	32
8	2	.30	7623	18.1	-1.8	341	316	28
2	2	.58	7630	2.9	-.6	-102	317	36
2	2	.16	7631	5.9	.2	-82	322	29
2	2	.05	7633	1.8	.2	-61	320	33
2	2	1.11	7634	.3	9.6	377	319	34
2	2	.77	7634	13.5	.2	-33	316	36
2	2	.28	7635	-1.3	4.3	-82	322	30
2	2	.49	7640	-1.3	.5	-75	322	29
2	2	.23	7643	3.2	-1.6	-68	322	29
2	2	1.39	7644	.5	-1.6	-130	318	31
2	2	.96	7646	5.9	2.2	1	316	36
2	2	1.15	7646	6.9	-.3	321	320	28
2	2	.21	7647	-1.6	0.0	-82	323	28
8	2	2.13	7649	39.4	-4.2	362	317	19
2	2	.16	7651	0.0	1.8	-47	323	26
2	2	.87	7655	3.5	0.0	-144	316	31
8	2	.17	7655	41.5	-4.0	390	317	19
2	2	.26	7657	3.8	-2.2	-75	321	28
8	2	.21	7658	38.6	2.1	369	316	23
8	2	.21	7661	37.0	-2.9	341	319	17
2	2	.79	7663	-3.0	4.8	391	319	33
8	2	.06	7663	37.5	-2.7	348	318	17
2	2	2.06	7669	-3.0	.5	-54	316	32
2	2	.79	7670	2.7	-1.8	-12	321	33
8	2	.77	7671	35.7	-2.1	313	319	17
2	2	.12	7672	2.1	-.3	-26	320	35
8	2	.17	7675	33.0	-4.6	327	319	17
2	2	.85	7676	-.3	5.9	356	320	35
2	2	.29	7677	5.5	-.8	-47	321	32
2	2	.60	7677	8.7	1.3	-54	314	38
2	2	.14	7680	-.5	-.2	-47	321	32
2	2	.31	7680	7.4	1.4	-33	315	35
8	2	.62	7682	43.9	-1.1	334	319	18
2	2	.32	7684	11.7	1.1	356	320	33
2	2	.46	7685	-.8	2.4	-26	317	32

TABLE A-3 - Continued

FLIGHT CONDITION: STEADY STATE (CONTINUED)

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
2	2	.65	7688	-.5	-3.7	-75	321	27
2	2	.32	7688	4.3	4.2	342	320	31
2	2	.35	7689	-3.0	3.0	-26	316	33
2	2	1.12	7689	-1.4	-1.6	-40	317	31
2	2	.17	7694	6.9	5.8	264	314	33
2	2	.44	7695	.3	-1.8	-54	316	30
2	2	.26	7696	.6	-2.2	-75	322	27
8	2	.23	7697	43.3	4.3	285	319	18
2	2	.81	7700	8.2	1.1	-33	318	29
8	2	.28	7700	43.8	2.1	327	317	20
8	2	.11	7702	39.4	1.1	292	318	22
2	2	.26	7703	5.5	7.1	384	319	30
2	2	.73	7705	.6	3.4	-12	315	37
2	2	.36	7709	4.5	4.3	349	319	30
2	2	1.61	7710	4.3	1.6	-68	322	28
2	2	.87	7711	5.5	.6	-26	316	37
8	2	1.04	7712	39.3	8.8	341	318	18
2	2	.40	7713	6.3	1.4	-33	316	35
2	2	.21	7715	-1.4	1.1	-19	314	39
2	2	1.02	7724	2.2	-1.6	-60	316	29
2	2	1.73	7732	4.3	1.1	-81	316	28
8	2	2.04	7732	30.3	4.3	306	316	27
8	2	.17	7734	38.0	5.3	313	319	17
2	2	.87	7736	2.2	0.0	-74	316	30
8	2	.23	7740	31.6	5.1	292	318	25
8	2	.19	7744	9.5	.6	278	314	35
8	2	.34	7749	43.8	6.6	383	319	19
8	2	.43	7756	27.9	-5.1	299	318	25
2	2	.21	7759	.6	-1.6	292	314	33
2	2	.64	7767	8.0	-.6	313	314	34
2	2	1.87	7806	.6	1.1	152	315	35
2	2	.38	7812	6.9	2.6	145	317	32
2	2	.79	7822	.6	8.7	131	315	34
2	2	.85	7834	1.0	4.6	103	316	30
2	2	1.26	7847	10.9	2.9	110	316	29

FLIGHT CONDITION: TRANSIENT

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
8	3	.21	7359	27.7	-.2	142	321	13
8	3	.21	7361	23.4	2.4	86	316	35

FLIGHT CONDITION: NORMAL TAKEOFF

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
2	4	.25	6871	-4.0	7.4	92	323	14
2	4	.27	6923	4.6	.6	99	322	12
2	4	.15	6990	1.6	-.2	-26	321	12
2	4	.19	7011	4.3	6.3	144	319	20
2	4	.09	7020	-.5	2.1	-66	322	18
2	4	.13	7023	1.6	-.6	-26	320	13
2	4	.15	7033	3.5	-1.0	-26	320	12
2	4	.24	7059	.6	6.3	-38	321	12
2	4	.14	7061	11.5	0.0	186	317	12
2	4	.35	7086	-2.2	-.2	419	316	12
2	4	.15	7095	0.0	-.6	137	321	12
2	4	.12	7105	3.5	1.3	83	323	17

TABLE A-3 - Continued

FLIGHT CONDITION: NORMAL TAKEOFF (CONTINUED)

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
2	4	.13	7108	5.8	8.5	-59	323	16
2	4	.42	7112	-.2	4.5	-27	318	12
2	4	.31	7136	5.6	5.8	99	322	15
2	4	.44	7149	1.9	-.5	-20	317	12
2	4	.37	7176	.5	-1.3	128	321	12
2	4	.47	7200	4.2	.2	132	321	10
2	4	.21	7223	6.4	-1.0	-61	320	15
2	4	.16	7236	5.3	1.6	100	322	23
2	4	.13	7246	-1.6	6.1	3	321	15
2	4	.23	7263	1.8	1.1	-41	318	12
2	4	.27	7272	6.1	-.2	128	321	13
2	4	.14	7277	-.2	-.3	114	319	11
2	4	.22	7279	2.7	1.1	-40	320	12
2	4	.27	7305	5.9	1.1	-61	320	15
2	4	.34	7314	1.0	-2.6	237	320	12
2	4	.20	7338	-1.3	1.9	100	319	12
2	4	.13	7339	2.2	.8	-54	322	12
2	4	.41	7343	4.2	4.3	121	319	11
2	4	.08	7367	2.6	.3	80	320	17
2	4	.15	7380	1.0	1.6	14	318	12
2	4	.22	7397	2.9	.6	-68	322	12
2	4	.27	7415	4.5	-.3	151	320	12
2	4	.21	7419	.5	-.6	0	318	13
2	4	.14	7437	1.6	-2.7	-54	322	12
2	4	.23	7448	1.9	-1.9	7	318	12
2	4	.33	7452	.2	-1.6	158	319	12
2	4	.26	7479	1.1	5.3	370	321	12
2	4	.15	7479	1.8	1.9	68	318	12
2	4	.17	7482	3.7	4.6	130	321	21
2	4	.26	7517	1.1	6.7	363	319	11
2	4	.21	7527	0.0	.5	61	319	11
2	4	.12	7531	.6	-.3	-26	322	12
2	4	.16	7562	7.7	.3	-54	322	11
2	4	.15	7565	1.3	2.1	33	321	19
2	4	.27	7570	2.2	-.5	-116	319	14
2	4	.26	7588	-.6	4.6	363	320	11
2	4	.13	7602	-1.1	.3	47	319	12
2	4	.27	7619	-.2	-.2	-40	317	12
2	4	.21	7646	-1.1	1.0	-137	321	18
2	4	.17	7648	2.6	1.0	384	320	12
2	4	.23	7659	0.0	-1.1	-47	322	12
2	4	.31	7660	.3	-2.4	-19	316	12
2	4	.28	7690	.8	-.3	-47	322	11
2	4	.15	7697	.5	-2.2	-12	317	12
2	4	.21	7710	10.3	1.6	391	320	11
2	4	.21	7726	4.2	1.0	-26	317	12
2	4	.15	7733	1.8	.8	-40	317	12
2	4	.15	7738	-1.4	.2	-47	317	12

FLIGHT CONDITION: COLECTIVE PUSHOVER

8	5	.06	6687	39.4	5.8	224	317	21
8	5	.15	6692	43.4	7.9	260	317	26
8	5	.17	6705	34.0	-3.4	168	317	23
8	5	.06	6789	22.4	4.2	63	317	26

TABLE A-3 - Continued

FLIGHT CONDITION: COLLECTIVE PUSHOVER (CONTINUED)

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
8	5	.04	6826	18.3	4.8	21	316	33
8	5	.07	6861	25.6	.5	489	316	24
8	5	.09	6870	29.3	1.0	574	316	26
8	5	.06	6877	27.9	-1.9	233	319	24
8	5	.07	6878	25.6	1.9	489	316	25
8	5	.07	6879	26.6	1.4	475	316	24
8	5	.17	6885	20.4	-.6	-20	317	30
8	5	.11	6890	18.3	-.3	-27	317	30
8	5	.11	6890	27.9	0.0	440	317	24
8	5	.13	6903	27.3	1.3	482	317	23
8	5	.15	6907	26.0	2.1	518	316	24
8	5	.06	6908	26.1	-4.5	247	318	29
8	5	.15	6909	28.4	1.3	518	316	25
8	5	.06	6913	16.4	3.2	-6	316	35
8	5	.11	6915	27.7	.8	489	317	25
8	5	.06	6921	38.6	-6.6	296	320	23
8	5	.06	6926	26.9	-.5	296	319	28
8	5	.08	6928	13.9	-1.4	0	317	30
8	5	.09	6931	38.5	.3	306	321	22
8	5	.11	6941	21.3	1.3	63	319	28
8	5	.05	6941	34.9	-1.4	315	322	25
8	5	.06	6949	23.1	5.1	49	319	28
8	5	.04	6949	30.3	.6	433	317	25
8	5	.12	6951	42.2	4.2	301	323	21
2	5	.06	6953	5.9	1.8	7	316	39
8	5	.06	6959	41.5	-3.0	362	316	21
2	5	.08	6962	15.5	1.6	177	319	30
8	5	.04	6973	34.6	1.0	233	322	17
8	5	.04	6978	35.4	4.6	70	319	22
2	5	.11	6982	7.1	.2	-55	317	36
8	5	.05	6999	37.3	.2	315	323	21
2	5	.06	7016	11.5	3.7	149	319	31
8	5	.07	7018	36.1	3.2	285	320	26
8	5	.08	7022	23.7	1.4	126	319	27
8	5	.06	7024	27.6	-1.4	154	319	24
8	5	.08	7025	20.2	2.7	318	320	30
8	5	.08	7025	23.9	1.3	140	319	28
8	5	.04	7028	42.2	6.7	205	322	20
8	5	.09	7037	24.8	1.9	306	316	24
8	5	.04	7041	32.5	1.9	299	316	28
8	5	.06	7048	30.5	-.6	299	317	22
8	5	.04	7051	9.1	13.5	346	320	31
8	5	.06	7059	28.7	3.8	243	317	22
8	5	.10	7061	17.6	1.4	184	319	31
8	5	.06	7069	30.1	.3	250	316	26
8	5	.06	7071	11.7	2.1	91	317	32
8	5	.10	7073	19.6	5.0	198	321	25
8	5	.09	7078	26.0	4.8	327	317	24
8	5	.04	7080	16.4	3.2	121	320	32
8	5	.06	7082	40.6	-5.8	168	320	18
8	5	.11	7090	14.3	-3.4	189	316	37
8	5	.04	7091	27.9	2.6	257	317	24
8	5	.06	7106	27.6	-2.2	257	316	25
8	5	.06	7109	34.3	1.1	257	317	22
2	5	.07	7114	12.2	.5	90	321	32

TABLE A-3 - Continued

FLIGHT CONDITION: COLLECTIVE PUSHOVER (CONTINUED)

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
8	5	.04	7117	26.1	.8	105	321	30
8	5	.09	7118	38.5	5.5	278	318	23
8	5	.04	7122	37.0	5.3	320	318	24
8	5	.06	7127	29.8	-4.0	210	319	25
8	5	.09	7131	34.9	2.1	341	317	22
8	5	.06	7138	34.3	-2.4	320	318	21
8	5	.04	7140	35.9	-3.5	161	319	23
8	5	.11	7145	36.1	-.6	362	317	23
8	5	.04	7150	31.4	5.1	363	321	21
8	5	.11	7152	16.5	5.9	122	319	32
8	5	.06	7152	25.2	-.8	105	322	27
8	5	.02	7158	21.5	4.6	300	321	29
2	5	.11	7175	8.8	-2.9	77	317	10
8	5	.06	7183	19.4	1.4	143	319	28
8	5	.04	7184	36.4	4.0	313	318	19
2	5	.04	7186	7.7	4.0	177	318	38
8	5	.06	7194	40.1	5.1	355	319	20
8	5	.11	7210	43.8	5.0	119	321	19
8	5	.11	7218	11.4	4.0	271	316	32
8	5	.08	7220	16.0	1.0	21	317	33
8	5	.08	7227	29.5	6.3	100	317	26
8	5	.06	7235	17.5	4.6	21	317	32
8	5	.04	7254	21.3	-.8	264	320	31
8	5	.08	7258	26.9	2.4	100	317	30
8	5	.04	7282	43.6	-2.4	243	316	20
8	5	.09	7304	36.5	2.1	313	319	22
8	5	.04	7308	43.0	-5.0	278	316	20
8	5	.06	7309	25.8	1.6	65	316	31
8	5	.04	7317	40.7	-3.4	327	313	26
8	5	.04	7318	42.2	-6.4	334	316	20
8	5	.09	7321	37.8	-4.3	384	319	27
8	5	.09	7323	41.7	2.9	362	315	25
2	5	.09	7327	6.6	1.1	8	320	36
8	5	.04	7346	37.2	-2.6	86	320	22
8	5	.08	7366	33.0	-.6	135	318	22
8	5	.09	7368	37.0	-3.4	404	315	22
8	5	.04	7374	35.3	4.8	348	316	19
8	5	.09	7379	30.3	7.4	313	314	26
8	5	.04	7380	28.4	3.0	299	314	28
8	5	.09	7384	27.4	5.5	285	315	25
8	5	.10	7390	19.7	1.3	170	316	29
2	5	.04	7393	12.0	1.9	123	319	31
8	5	.06	7400	28.2	4.6	250	313	30
8	5	.11	7404	31.4	7.9	257	315	23
8	5	.09	7411	19.1	4.5	250	314	31
8	5	.04	7415	18.8	1.6	243	315	29
8	5	.06	7425	34.8	.3	107	317	23
8	5	.06	7430	39.9	9.3	142	318	26
8	5	.06	7438	34.3	-6.4	93	318	23
8	5	.09	7440	27.9	0.0	168	321	24
8	5	.06	7441	36.7	-4.3	93	319	25
8	5	.08	7462	27.7	1.9	107	317	26
8	5	.06	7468	28.4	-1.9	105	320	28
2	5	.06	7479	10.9	2.7	58	317	37
8	5	.04	7497	31.7	1.0	58	318	27

TABLE A-3 - Continued

FLIGHT CONDITION: COLLECTIVE PUSHOVER (CONTINUED)

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
2	5	.06	7505	12.0	1.6	54	318	32
2	5	.07	7537	13.0	4.2	-47	321	29
8	5	.11	7540	43.4	-2.6	432	317	22
8	5	.04	7552	22.6	1.4	58	317	31
8	5	.04	7557	25.5	3.7	72	317	27
8	5	.06	7563	43.8	7.7	327	316	25
8	5	.04	7565	18.9	3.5	23	316	31
8	5	.09	7577	30.9	-1.8	292	316	24
8	5	.04	7585	30.9	6.9	278	316	27
8	5	.09	7598	36.2	6.6	341	318	21
8	5	.06	7600	32.5	2.2	362	316	22
8	5	.06	7603	37.7	6.7	376	315	28
8	5	.06	7655	42.3	1.0	362	316	25
8	5	.04	7662	37.0	-.8	341	316	25
8	5	.06	7663	42.3	-6.1	341	315	29
8	5	.11	7672	36.1	-2.4	313	316	26
8	5	.04	7735	34.9	8.7	313	316	27
8	5	.09	7750	43.8	3.2	369	316	27

FLIGHT CONDITION: COLLECTIVE PULL-UP

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
8	6	.04	6686	37.2	7.4	210	318	15
8	6	.04	6693	35.3	8.3	196	318	18
8	6	.04	6784	23.6	-3.4	77	318	21
8	6	.06	6796	43.6	8.0	283	323	17
8	6	.11	6826	22.3	1.6	21	318	24
8	6	.11	6840	24.8	.5	49	319	20
8	6	.13	6859	20.5	4.5	14	319	21
8	6	.07	6860	28.5	-2.7	482	318	17
8	6	.13	6865	29.2	8.2	426	320	22
8	6	.17	6869	33.8	-1.0	589	319	12
8	6	.12	6874	21.8	-.5	370	319	23
8	6	.06	6875	29.0	0.0	370	319	20
8	6	.09	6876	33.3	-1.3	496	319	15
8	6	.07	6879	30.0	.8	482	318	17
8	6	.06	6884	28.4	3.5	385	319	20
8	6	.11	6889	20.5	-4.0	14	320	22
8	6	.07	6892	27.4	-3.2	454	317	18
8	6	.14	6896	36.4	-5.3	217	322	20
8	6	.09	6902	30.6	-1.9	489	318	16
8	6	.11	6908	31.1	.3	525	319	16
8	6	.08	6909	25.5	-3.5	247	321	19
8	6	.10	6910	33.5	-3.0	233	321	19
8	6	.15	6912	40.7	4.0	355	321	17
8	6	.06	6918	33.5	.8	356	320	17
8	6	.11	6925	20.7	1.6	-6	319	24
8	6	.04	6926	25.6	-4.0	219	321	21
8	6	.09	6929	36.4	1.0	320	322	13
8	6	.09	6930	30.0	4.3	292	316	18
8	6	.04	6931	22.6	6.3	300	321	20
8	6	.11	6932	30.8	-1.1	440	318	19
8	6	.04	6934	26.3	-.6	293	322	19
8	6	.02	6934	36.9	-2.2	301	323	18
8	6	.15	6934	38.0	-4.2	56	320	18
8	6	.09	6939	25.6	2.1	433	317	19

TABLE A-3 - Continued

FLIGHT CONDITION: COLLECTIVE PULL-UP (CONTINUED)

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
8	6	.09	6947	34.0	.2	433	319	15
8	6	.12	6950	41.5	4.2	329	324	14
8	6	.08	6953	27.7	-.8	219	321	20
8	6	.04	6961	40.2	-3.4	334	317	16
8	6	.04	6966	36.5	6.9	299	318	18
8	6	.06	6978	34.8	6.4	91	320	16
8	6	.06	6979	34.0	-2.4	156	322	21
2	6	.11	6983	10.9	-1.6	-55	317	27
8	6	.04	6983	35.6	-.2	271	318	16
8	6	.04	6986	13.8	-6.4	121	321	23
8	6	.06	6990	30.5	4.0	126	321	17
8	6	.04	6995	38.5	6.6	306	319	16
8	6	.08	6999	32.1	6.6	224	321	13
8	6	.11	7013	43.6	9.8	246	319	24
8	6	.04	7022	25.3	6.4	332	322	22
8	6	.09	7038	31.4	4.3	306	317	20
8	6	.09	7047	32.7	-.2	299	319	16
8	6	.04	7059	32.7	0.0	250	319	16
8	6	.08	7061	20.4	1.6	212	321	24
8	6	.04	7069	31.4	-5.0	257	319	16
8	6	.04	7080	15.7	5.0	149	322	25
8	6	.10	7095	20.2	2.2	374	320	22
8	6	.06	7096	16.0	-10.6	217	321	21
8	6	.06	7100	32.5	-3.5	316	321	12
8	6	.15	7105	33.3	-4.5	239	320	20
8	6	.09	7117	25.2	-3.2	133	324	19
8	6	.04	7119	34.6	8.0	299	317	20
8	6	.13	7119	42.0	-7.7	307	320	23
2	6	.08	7120	13.8	-5.3	210	318	28
8	6	.13	7120	45.4	-.2	307	322	19
8	6	.06	7127	18.8	-2.4	246	321	16
8	6	.11	7130	40.4	9.5	171	321	22
8	6	.04	7139	36.1	0.0	327	319	16
8	6	.09	7144	35.7	-.8	369	319	15
8	6	.11	7146	36.2	2.9	348	319	17
8	6	.06	7149	33.5	4.0	363	324	16
2	6	.02	7150	-5.0	5.6	219	319	31
8	6	.08	7156	34.0	-4.5	112	319	20
2	6	.08	7174	12.0	-5.1	77	318	28
8	6	.06	7176	28.5	-2.7	63	324	22
2	6	.04	7186	9.0	3.5	191	319	31
8	6	.13	7195	18.4	4.5	157	321	22
8	6	.04	7201	18.3	6.7	51	319	23
8	6	.06	7211	32.7	6.1	72	321	16
8	6	.09	7219	18.9	3.7	299	319	22
8	6	.08	7219	23.1	-.8	70	320	24
8	6	.08	7223	29.3	-1.1	72	319	18
8	6	.04	7227	31.7	6.6	100	318	20
8	6	.04	7231	36.2	7.5	86	320	18
8	6	.06	7235	24.0	1.4	42	319	26
8	6	.13	7237	24.4	7.4	42	319	25
8	6	.04	7256	33.0	9.3	426	320	18
8	6	.08	7259	26.8	2.9	93	318	24
8	6	.13	7269	43.6	-5.3	285	316	18
8	6	.06	7283	33.0	2.9	271	323	16

TABLE A-3 - Continued

FLIGHT CONDITION: COLLECTIVE PULL-UP (CONTINUED)

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
8	6	.06	7289	38.8	-3.8	243	317	18
8	6	.13	7295	35.6	7.2	286	320	20
8	6	.09	7303	35.6	-1.1	327	321	14
8	6	.06	7305	42.3	-2.9	285	318	15
8	6	.06	7309	27.4	2.9	58	319	23
8	6	.04	7311	33.7	-1.6	114	320	18
8	6	.04	7312	43.3	.8	299	317	15
8	6	.04	7317	40.7	-5.3	327	317	15
2	6	.11	7326	6.4	.5	36	322	27
8	6	.09	7337	21.5	-.5	278	320	23
8	6	.04	7346	36.2	-4.6	93	321	16
8	6	.06	7348	21.3	2.6	257	319	24
8	6	.06	7365	17.3	4.8	65	319	25
8	6	.06	7369	30.6	-2.9	128	319	19
8	6	.04	7373	33.7	9.8	341	316	17
8	6	.04	7380	34.3	2.7	299	317	20
8	6	.09	7382	29.5	-.8	285	316	20
8	6	.04	7390	22.4	0.0	163	318	23
8	6	.06	7392	24.8	0.0	177	318	23
8	6	.04	7393	33.8	4.2	121	319	20
8	6	.06	7400	30.6	5.6	257	316	18
8	6	.08	7407	27.9	-2.4	163	318	20
8	6	.04	7410	30.9	-3.4	163	319	20
8	6	.08	7425	32.7	-1.9	107	319	17
8	6	.10	7427	33.3	10.4	170	320	15
8	6	.06	7438	33.2	-6.3	93	320	17
8	6	.09	7440	33.2	-3.4	154	323	19
8	6	.06	7521	33.0	0.0	334	318	18
2	6	.12	7536	17.5	.8	-40	324	22
8	6	.04	7538	43.8	-6.4	390	319	14
8	6	.09	7540	43.8	-1.3	425	319	11
8	6	.04	7548	40.6	-4.2	327	319	18
8	6	.09	7571	18.3	4.6	250	319	14
8	6	.04	7576	32.4	-4.5	292	317	16
8	6	.06	7597	36.5	5.5	334	319	15
8	6	.09	7604	39.1	6.6	369	317	20
8	6	.11	7615	35.6	1.3	341	319	15
2	6	.07	7633	11.7	1.3	-47	323	25
8	6	.11	7656	40.9	8.2	383	317	18
8	6	.06	7662	35.7	-3.2	355	318	16
8	6	.06	7698	42.0	-1.8	306	319	13
8	6	.06	7733	34.0	5.1	306	318	18
8	6	.04	7735	36.5	3.5	320	319	16

FLIGHT CONDITION: DECELERATION

8	7	.15	6680	26.4	-1.8	161	318	17
8	7	.19	6704	33.7	-6.4	210	319	15
8	7	.15	6717	23.4	.6	105	318	24
8	7	.19	6780	30.6	-8.2	105	317	21
8	7	.17	6857	24.0	.8	482	317	21
8	7	.18	6883	27.3	-1.6	247	321	17
8	7	.33	6901	30.1	-1.3	261	320	19
8	7	.25	6918	35.7	-4.3	275	321	18
8	7	.20	6946	27.9	-.6	289	320	21

TABLE A-3 - Continued

FLIGHT CONDITION: DECELERATION (CONTINUED)

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
8	7	.28	6949	37.8	2.4	315	323	19
8	7	.19	6973	19.6	7.5	84	318	27
8	7	.16	6973	34.6	-4.6	247	323	15
8	7	.28	6984	42.0	-3.4	343	324	15
8	7	.23	6986	30.3	-5.1	332	321	19
8	7	.21	7008	36.2	-.6	322	324	18
8	7	.14	7026	26.6	3.7	226	320	21
8	7	.18	7026	34.0	5.3	212	323	15
8	7	.28	7036	30.5	5.0	313	318	18
8	7	.20	7036	38.8	5.3	289	322	17
8	7	.19	7042	31.4	-1.4	140	319	18
8	7	.15	7082	33.7	-5.0	175	320	15
8	7	.21	7096	27.1	-5.1	332	323	19
8	7	.15	7115	18.9	-4.0	119	322	24
8	7	.23	7138	33.8	-4.5	327	319	16
8	7	.17	7158	36.4	8.0	186	322	16
8	7	.21	7161	26.4	-1.3	342	322	20
8	7	.35	7169	21.8	2.1	226	320	24
8	7	.17	7181	22.0	2.7	299	322	24
8	7	.27	7201	30.1	4.2	37	319	20
8	7	.26	7205	18.0	-.5	370	318	28
8	7	.17	7209	34.3	7.2	161	322	9
8	7	.30	7212	36.9	-5.6	455	321	13
8	7	.17	7217	16.7	5.9	271	319	23
8	7	.21	7221	31.1	.8	313	320	15
8	7	.27	7238	27.4	5.6	271	321	23
8	7	.30	7239	30.8	3.0	448	321	20
8	7	.33	7260	44.1	5.0	349	324	12
8	7	.37	7283	39.1	-3.7	8	324	16
8	7	.19	7320	25.2	.6	-40	321	25
8	7	.17	7346	25.0	1.8	79	317	27
8	7	.15	7511	20.2	0.0	93	317	29
8	7	.17	7543	29.2	1.6	100	317	26

FLIGHT CONDITION: TOUCHDOWN

2	8	0.00	6890	-.2	-2.7	71	322	24
2	8	0.00	6927	.8	1.1	57	322	26
2	8	0.00	6996	5.3	.5	-54	322	24
2	8	0.00	7017	5.5	6.7	123	318	27
2	8	0.00	7027	2.1	2.9	-87	322	26
2	8	0.00	7029	3.5	-1.3	-61	321	25
8	8	0.00	7033	-2.6	-.5	229	318	22
2	8	0.00	7040	2.7	2.7	144	318	26
2	8	0.00	7051	2.9	1.6	-68	321	26
2	8	0.00	7090	-2.7	6.3	-80	322	26
2	8	0.00	7097	-2.7	-.5	109	321	26
2	8	0.00	7110	3.7	1.1	69	322	25
2	8	0.00	7124	4.5	3.8	-75	319	27
2	8	0.00	7148	3.0	.8	85	321	27
2	8	0.00	7171	3.5	1.8	-75	319	26
2	8	0.00	7234	4.0	-1.9	-75	318	26
2	8	0.00	7251	-1.0	5.3	-24	321	26
2	8	0.00	7275	5.1	.2	-82	319	25
2	8	0.00	7282	3.8	.5	86	323	16

TABLE A-3 - Continued

FLIGHT CONDITION: TOUCHDOWN (CONTINUED)

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
2	8	0.00	7308	1.1	-2.9	86	320	26
2	8	0.00	7318	5.0	2.9	202	320	26
2	8	0.00	7321	4.5	1.0	-96	323	25
2	8	0.00	7351	4.8	.3	-96	323	25
2	8	0.00	7352	.5	4.8	59	320	27
2	8	0.00	7356	1.6	.2	-89	323	26
2	8	0.00	7362	5.9	3.4	86	320	27
2	8	0.00	7374	3.2	-1.1	-96	323	26
2	8	0.00	7375	-2.4	6.3	223	321	27
2	8	0.00	7385	2.7	6.7	-27	318	26
2	8	0.00	7423	3.8	4.2	116	320	26
2	8	0.00	7429	2.4	5.5	216	319	29
2	8	0.00	7430	-4.2	2.6	-20	319	25
2	8	0.00	7433	0.0	-2.2	-89	322	26
2	8	0.00	7457	-1.4	5.5	335	320	27
2	8	0.00	7459	2.1	-1.9	-27	319	27
2	8	0.00	7464	3.2	1.4	116	320	26
2	8	0.00	7484	2.7	4.6	328	320	27
2	8	0.00	7498	3.7	1.1	19	319	27
2	8	0.00	7508	-1.4	-2.7	-68	323	25
2	8	0.00	7534	2.9	-1.8	-75	323	24
2	8	0.00	7543	-.3	3.8	342	320	28
2	8	0.00	7547	4.5	-1.1	26	319	26
2	8	0.00	7576	2.6	-.2	19	320	26
2	8	0.00	7588	.8	-3.7	-123	319	27
2	8	0.00	7589	2.4	6.7	328	321	27
2	8	0.00	7600	3.4	5.3	328	320	29
2	8	0.00	7611	3.0	2.1	328	321	27
2	8	0.00	7624	-2.6	.8	-144	319	27
2	8	0.00	7627	-.6	1.1	-74	318	27
2	8	0.00	7630	1.9	-1.4	-89	323	25
2	8	0.00	7647	.5	.2	-144	319	28
2	8	0.00	7657	1.0	.2	328	320	28
2	8	0.00	7664	-.3	-2.4	-82	323	26
2	8	0.00	7677	2.2	1.3	-47	317	28
2	8	0.00	7694	-1.0	1.6	-75	323	22
2	8	0.00	7698	-.8	-3.2	-47	318	25
2	8	0.00	7701	1.1	5.6	342	320	29
2	8	0.00	7728	2.7	1.3	-67	317	29

FLIGHT CONDITION: MAXIMUM PERFORMANCE TAKEOFF

2	10	.09	7020	-4.2	-3.2	271	317	11
2	10	.08	7034	6.7	4.5	165	317	12
2	10	.17	7057	2.4	.3	-40	321	12
2	10	.13	7360	.2	4.5	251	320	11
2	10	.06	7369	3.0	1.0	-68	322	12
2	10	.14	7374	4.5	8.7	135	321	11
2	10	.09	7415	6.7	-.6	-47	321	12
2	10	.13	7419	3.7	4.5	237	321	10
2	10	.09	7451	-.2	2.1	342	321	16
2	10	.06	7598	6.7	3.4	363	321	11
2	10	.06	7604	7.5	5.9	370	321	11
2	10	.21	7622	-.5	.2	-102	319	12
2	10	.08	7656	5.1	.8	-109	318	12
2	10	.15	7689	.6	5.1	384	321	11

TABLE A-3 - Continued

FLIGHT CONDITION: LEFT TURN

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
8	11	.44	6684	34.6	5.8	168	319	17
8	11	.23	6698	12.0	3.2	140	317	28
8	11	.21	6788	24.8	2.1	91	318	20
8	11	.19	6797	18.9	4.8	42	318	24
8	11	.33	6839	44.2	9.5	297	322	20
2	11	.30	6853	-2.9	1.8	468	314	33
8	11	.33	6863	27.3	1.8	482	317	20
8	11	.28	6872	29.7	1.3	525	317	20
8	11	.27	6890	30.6	2.2	399	319	22
8	11	.35	6895	28.9	-2.6	468	318	19
8	11	.28	6897	25.8	1.1	454	316	24
8	11	.24	6897	27.6	4.8	314	321	23
2	11	.27	6899	11.7	.5	219	319	28
8	11	.45	6900	42.2	-3.5	210	323	16
8	11	.33	6904	32.5	-3.7	268	320	23
2	11	.23	6908	11.9	.6	99	321	30
8	11	.31	6914	41.7	.8	252	323	18
8	11	.39	6916	14.7	-3.8	247	319	29
2	11	.27	6917	6.4	0.0	71	321	28
8	11	.37	6917	35.6	-.8	254	321	19
8	11	.40	6924	43.0	2.4	322	323	16
8	11	.22	6928	27.6	1.6	454	317	21
8	11	.35	6929	27.3	-3.5	205	321	19
2	11	.37	6931	9.6	2.4	311	318	29
2	11	.29	6935	-.5	5.1	282	318	31
8	11	.41	6936	14.9	.6	205	319	32
8	11	.28	6937	35.9	.3	264	318	17
8	11	.19	6938	24.4	1.8	293	321	23
8	11	.34	6938	36.5	-6.6	63	319	20
8	11	.28	6947	15.5	-2.4	299	319	30
8	11	.38	6947	18.3	1.8	287	320	27
8	11	.48	6948	19.6	-3.8	0	319	24
8	11	.20	6950	29.5	3.5	412	318	21
2	11	.29	6953	9.3	4.2	28	319	27
2	11	.19	6956	-1.8	-5.5	341	316	29
8	11	.24	6957	46.3	5.9	372	324	13
8	11	.25	6958	23.7	1.6	289	318	27
8	11	.46	6961	23.9	1.3	397	320	25
2	11	.14	6964	1.6	-2.1	177	318	31
2	11	.15	6965	5.8	.6	35	318	30
8	11	.25	6965	34.1	2.6	296	320	19
8	11	.38	6965	37.0	6.3	299	316	24
2	11	.30	6967	10.4	3.2	-61	321	28
8	11	.30	6968	30.3	3.0	355	321	20
2	11	.35	6970	3.2	-1.4	184	319	31
8	11	.28	6970	30.9	5.0	362	321	20
8	11	.38	6974	38.0	-3.0	250	318	19
8	11	.33	6977	19.6	2.4	289	319	28
8	11	.29	6977	34.0	9.6	126	320	23
8	11	.31	6978	34.6	-3.7	191	323	20
8	11	.21	6981	26.8	5.3	105	321	20
8	11	.37	6985	38.2	-.3	327	322	20
8	11	.15	6987	34.6	6.7	105	319	22
8	11	.13	6992	36.5	-2.6	175	322	16
8	11	.34	6992	40.4	3.7	306	317	16

TABLE A-3 - Continued

FLIGHT CONDITION: LEFT TURN (CONTINUED)

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
8	11	.25	6998	35.6	3.0	196	320	21
8	11	.26	7005	18.6	1.6	270	320	27
8	11	.16	7005	23.9	4.0	128	321	22
2	11	.30	7007	-4.0	1.4	-12	320	32
2	11	.26	7007	12.7	-.6	280	320	33
2	11	.24	7009	-4.0	2.2	-52	320	31
8	11	.27	7009	40.1	-7.7	295	322	11
2	11	.39	7010	5.3	0.0	-19	320	31
8	11	.20	7010	17.5	1.6	121	319	27
8	11	.44	7012	43.8	10.7	281	318	30
8	11	.28	7013	29.3	4.3	285	320	23
8	11	.23	7015	40.9	4.2	168	318	26
2	11	.41	7016	-3.5	0.0	-26	321	29
8	11	.23	7017	41.2	-4.0	154	318	24
2	11	.27	7019	5.8	-4.0	149	319	29
2	11	.34	7019	5.8	-.6	-47	320	30
2	11	.25	7020	-2.6	2.2	144	317	31
8	11	.23	7024	31.7	-5.9	189	322	16
8	11	.14	7028	39.4	-1.4	247	320	17
8	11	.29	7031	40.2	8.2	198	322	19
2	11	.31	7033	5.8	1.4	130	316	31
2	11	.24	7037	-12.8	.6	-3	320	30
8	11	.35	7038	23.1	5.0	240	322	20
2	11	.21	7039	9.8	6.3	318	320	30
2	11	.34	7042	6.7	1.9	-45	320	31
2	11	.25	7044	-10.9	-4.0	207	317	30
8	11	.36	7044	22.8	-3.0	299	318	23
8	11	.31	7046	19.7	2.6	226	320	25
2	11	.32	7047	-6.7	-2.7	-45	319	33
2	11	.29	7048	7.5	3.7	186	317	30
8	11	.32	7050	33.3	9.3	154	320	18
2	11	.56	7051	3.4	4.0	-59	321	29
2	11	.39	7054	-6.7	-.8	179	317	29
2	11	.39	7056	.2	.8	426	316	31
2	11	.33	7057	7.9	2.4	151	316	31
8	11	.23	7059	20.7	3.0	198	321	26
8	11	.39	7060	22.0	1.3	219	319	26
2	11	.39	7064	-2.2	.2	419	315	32
8	11	.27	7065	37.0	4.6	332	321	20
8	11	.25	7066	22.4	7.2	98	319	28
2	11	.35	7071	.2	2.1	404	316	30
8	11	.27	7073	28.5	3.5	240	320	21
8	11	.34	7073	30.6	4.6	285	317	20
2	11	.33	7075	-.5	1.0	397	315	32
8	11	.32	7080	35.9	-5.5	320	319	18
2	11	.19	7094	12.3	-.5	161	318	30
2	11	.26	7102	4.3	1.6	102	320	30
2	11	.30	7114	1.8	-.3	123	320	30
2	11	.19	7115	14.9	8.8	189	318	32
2	11	.21	7117	11.2	2.2	97	321	29
2	11	.52	7121	-1.9	1.3	144	320	32
2	11	.33	7123	.2	.2	76	321	28
8	11	.24	7124	28.9	-2.6	105	322	26
2	11	.50	7126	2.6	-.8	144	319	33
2	11	.23	7130	-7.5	.5	-41	317	30

TABLE A-3 - Continued

FLIGHT CONDITION: LEFT TURN (CONTINUED)

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
2	11	.21	7131	4.2	1.4	76	321	29
8	11	.22	7132	23.4	-1.4	105	322	24
8	11	.17	7134	27.6	-1.1	293	320	22
2	11	.52	7135	-1.3	2.1	116	319	32
8	11	.27	7135	30.1	-2.4	168	319	25
8	11	.23	7136	16.5	3.2	212	320	29
8	11	.39	7136	25.3	4.3	98	323	24
8	11	.19	7138	30.6	-2.2	300	319	23
2	11	.17	7140	-.3	-2.2	72	317	33
2	11	.46	7141	-.6	0.0	102	320	30
8	11	.26	7143	9.8	1.3	334	317	28
2	11	.34	7144	6.9	.2	-68	317	28
8	11	.32	7149	31.9	5.3	313	319	22
2	11	.28	7150	-.2	2.4	132	321	32
2	11	.33	7153	6.4	-2.4	212	319	32
2	11	.26	7155	7.7	-.5	125	321	32
2	11	.40	7161	0.0	0.0	139	320	32
2	11	.29	7161	6.9	-.2	135	321	32
2	11	.22	7165	9.5	4.5	108	319	30
2	11	.28	7166	1.6	-1.6	132	321	31
8	11	.27	7168	36.4	.3	65	319	18
2	11	.26	7172	.6	-.2	109	318	31
2	11	.19	7174	1.3	.8	-61	318	28
8	11	.25	7175	18.4	1.8	226	322	22
8	11	.17	7176	35.9	.6	264	319	20
8	11	.21	7177	22.9	.8	58	319	26
2	11	.47	7180	.2	2.4	118	321	32
2	11	.13	7181	-9.5	5.8	-55	316	34
2	11	.27	7181	1.3	.2	44	317	31
8	11	.21	7182	23.2	1.8	306	322	26
8	11	.19	7185	23.1	-2.1	377	320	24
8	11	.23	7186	30.9	4.8	299	318	21
2	11	.40	7188	7.4	.3	111	321	30
8	11	.19	7189	39.4	3.0	321	322	17
2	11	.27	7194	9.1	-2.1	191	319	30
2	11	.13	7197	7.9	-.6	-68	318	29
2	11	.23	7197	11.7	4.3	321	320	30
2	11	.21	7198	6.6	3.4	23	317	31
2	11	.19	7200	-3.7	-.8	-55	318	30
2	11	.14	7202	6.1	8.2	335	319	31
8	11	.27	7203	30.0	5.0	37	319	21
8	11	.29	7211	23.6	1.4	51	318	26
8	11	.31	7214	30.9	2.6	72	320	22
8	11	.21	7215	43.8	.6	98	319	22
8	11	.44	7217	22.6	-6.7	50	321	19
8	11	.23	7221	44.9	2.1	71	323	21
8	11	.42	7225	45.0	-3.5	15	323	19
2	11	.50	7229	4.3	1.3	51	317	34
2	11	.21	7235	-.5	-2.4	398	317	30
2	11	.31	7236	9.3	1.6	229	320	32
2	11	.32	7244	-9.9	3.7	-6	316	32
8	11	.31	7246	33.0	6.3	114	319	19
2	11	.36	7247	1.8	-7.7	-6	317	34
2	11	.44	7254	.5	4.3	-55	318	32
8	11	.36	7256	43.1	8.0	327	320	18

TABLE A-3 - Continued

FLIGHT CONDITION: LEFT TURN (CONTINUED)

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
2	11	.37	7257	-10.3	-1.8	38	317	35
2	11	.48	7258	4.5	.5	-68	318	30
8	11	.25	7260	33.5	6.4	100	320	20
2	11	.28	7262	7.7	9.1	38	320	29
8	11	.28	7263	29.3	2.6	285	319	21
2	11	.22	7265	.2	-10.7	38	319	29
8	11	.35	7266	42.8	-5.6	328	322	23
2	11	.30	7267	4.6	7.7	17	321	28
2	11	.19	7268	4.5	1.0	-75	321	30
8	11	.23	7271	25.3	1.4	156	319	23
8	11	.28	7272	43.6	-5.6	271	318	15
2	11	.26	7273	8.8	5.6	10	318	28
2	11	.43	7274	1.1	.3	80	319	29
8	11	.43	7275	43.8	8.7	264	315	24
8	11	.34	7281	42.3	-7.7	285	319	12
8	11	.29	7283	31.7	.5	278	320	24
8	11	.26	7285	28.2	1.0	229	319	23
2	11	.23	7287	2.6	-.8	93	317	33
8	11	.25	7288	32.2	3.8	142	318	23
2	11	.20	7289	1.9	5.5	114	318	32
8	11	.33	7290	43.6	-3.7	-5	323	21
8	11	.40	7292	35.7	-.3	257	315	21
2	11	.25	7294	3.2	-1.9	107	317	32
8	11	.23	7297	43.1	-4.0	-12	323	20
8	11	.36	7299	43.8	-4.0	278	317	17
2	11	.33	7301	6.1	1.0	100	319	34
8	11	.21	7306	42.0	-1.4	278	316	17
8	11	.23	7306	44.7	-6.7	348	320	20
2	11	.30	7311	7.5	-.6	272	318	32
2	11	.29	7312	-5.1	3.2	128	318	33
2	11	.23	7316	3.8	-1.4	114	317	35
8	11	.25	7319	38.0	-3.2	93	320	18
2	11	.43	7320	-4.3	.3	93	318	33
2	11	.29	7322	-5.1	3.2	107	319	31
2	11	.41	7325	5.5	-.3	73	318	34
8	11	.42	7325	38.6	6.3	107	320	21
8	11	.36	7325	44.4	6.1	369	319	24
2	11	.25	7326	7.7	-1.0	100	318	32
8	11	.34	7333	13.0	1.6	243	318	29
2	11	.39	7334	-.6	6.6	73	319	29
2	11	.55	7335	1.6	7.2	121	317	35
8	11	.38	7340	27.7	-2.4	306	318	25
2	11	.26	7341	14.1	.5	348	315	29
8	11	.17	7341	39.0	-3.8	86	319	20
2	11	.23	7343	14.9	-.3	376	315	28
2	11	.33	7344	7.9	5.1	72	316	32
2	11	.28	7346	2.6	11.1	397	312	33
8	11	.32	7347	15.9	4.6	222	319	26
8	11	.23	7351	29.3	.6	107	319	22
2	11	.15	7361	2.4	2.1	-54	320	33
8	11	.21	7362	30.0	2.1	79	318	21
2	11	.30	7363	4.6	1.8	-68	321	32
8	11	.27	7364	33.3	-.3	114	319	20
2	11	.23	7379	3.5	4.0	130	319	31
8	11	.23	7379	26.8	1.6	135	317	24
8	11	.34	7379	34.0	11.1	369	316	20

TABLE A-3 - Continued

FLIGHT CONDITION: LEFT TURN (CONTINUED)

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
2	11	.37	7381	-.8	.2	-40	321	34
2	11	.37	7384	8.5	1.3	-68	321	32
2	11	.32	7389	.8	0.0	-68	322	32
2	11	.30	7389	8.0	4.3	258	319	34
2	11	.49	7393	2.7	3.7	-89	321	32
2	11	.23	7394	-5.1	-.8	-13	319	29
8	11	.25	7394	33.3	2.6	51	319	22
2	11	.33	7395	6.4	1.8	123	320	29
2	11	.19	7400	1.9	0.0	137	318	34
2	11	.21	7401	-.6	1.1	-13	317	30
8	11	.21	7402	29.3	-.6	184	319	23
8	11	.27	7404	30.6	-1.0	184	320	21
2	11	.24	7406	.6	-3.2	251	319	34
2	11	.21	7407	7.9	.2	251	319	33
8	11	.19	7407	25.6	1.1	163	318	26
2	11	.21	7417	-3.0	-2.2	-27	317	28
8	11	.35	7424	28.1	1.1	107	318	23
2	11	.33	7432	-3.8	1.6	179	319	31
2	11	.33	7435	4.6	1.1	158	319	35
2	11	.27	7436	-3.8	4.2	21	316	35
2	11	.21	7436	7.5	7.7	223	319	32
2	11	.29	7438	2.9	-1.3	0	316	34
8	11	.27	7438	33.5	1.4	107	319	23
2	11	.31	7440	-9.3	1.3	165	319	32
2	11	.27	7443	-2.7	4.0	0	317	33
2	11	.37	7443	8.7	1.9	137	319	33
2	11	.34	7446	4.8	-1.1	-13	317	31
2	11	.28	7456	-.3	-2.1	230	320	30
2	11	.23	7462	5.5	3.5	-13	318	30
8	11	.17	7466	28.2	1.4	79	318	25
8	11	.23	7468	33.0	-.5	72	318	22
8	11	.21	7473	21.6	3.5	58	319	29
8	11	.21	7475	21.3	1.1	79	320	25
2	11	.29	7476	14.7	6.6	151	320	27
2	11	.25	7479	1.6	4.0	-27	317	31
2	11	.29	7483	6.7	3.8	65	319	31
2	11	.40	7487	2.7	1.8	65	317	35
2	11	.38	7496	9.6	1.8	363	320	34
2	11	.25	7498	.5	1.3	72	316	34
8	11	.25	7501	33.2	1.8	44	319	22
2	11	.32	7506	9.8	1.0	349	318	33
2	11	.21	7507	0.0	-2.4	72	316	34
2	11	.35	7513	6.1	.6	23	318	32
2	11	.35	7514	-.8	3.4	-5	320	32
2	11	.40	7517	1.6	-2.1	-26	321	32
2	11	.19	7519	1.3	1.1	47	318	29
2	11	.35	7522	-3.0	1.8	-40	320	34
2	11	.35	7525	2.9	-.8	-40	321	31
2	11	.26	7525	3.8	1.9	19	318	28
8	11	.27	7526	16.7	4.5	79	317	30
2	11	.19	7536	-.3	-.5	-61	321	32
2	11	.37	7537	5.0	-2.7	93	316	32
2	11	.35	7540	1.6	-.8	-54	321	28
2	11	.34	7556	4.0	.5	61	318	33
2	11	.43	7561	-.3	-1.4	54	319	31

TABLE A-3 - Continued

FLIGHT CONDITION: LEFT TURN (CONTINUED)

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
8	11	.32	7563	43.9	7.2	334	319	16
8	11	.47	7569	21.8	3.0	243	316	27
8	11	.38	7574	35.9	-3.5	264	318	19
8	11	.30	7579	28.4	8.7	313	317	20
2	11	.19	7589	-.5	9.6	285	314	32
2	11	.28	7589	-.2	-3.2	33	319	30
2	11	.27	7591	4.3	1.6	37	316	34
2	11	.23	7593	-.3	4.3	33	319	30
2	11	.21	7605	-1.4	5.0	-123	318	32
2	11	.24	7624	9.6	-5.5	405	320	31
2	11	.40	7626	.5	-2.6	369	315	31
2	11	.19	7631	.6	.6	-95	317	36
2	11	.21	7632	.8	1.4	-82	322	29
2	11	.12	7636	-1.3	-1.3	-82	322	29
2	11	.23	7641	3.8	-1.3	-75	321	30
2	11	.28	7653	3.8	-1.0	-47	321	29
8	11	.32	7653	40.6	1.3	376	317	19
2	11	.28	7669	8.0	-1.6	370	320	34
2	11	.26	7671	0.0	-.2	-26	320	36
2	11	.27	7672	1.1	-1.3	-60	317	31
2	11	.37	7675	2.9	-.6	-33	320	35
2	11	.30	7679	.3	-.2	-61	321	34
2	11	.24	7681	5.9	-2.4	363	318	36
2	11	.44	7683	5.1	-1.4	-61	320	33
8	11	.32	7684	41.0	-1.0	292	317	25
2	11	.17	7685	7.2	9.1	370	319	32
2	11	.30	7692	10.3	2.9	250	315	32
2	11	.33	7693	4.8	2.6	-74	317	35
2	11	.37	7698	1.9	1.1	-75	322	28
8	11	.19	7701	40.1	-.5	320	317	22
2	11	.23	7709	4.2	-2.1	-12	316	35
2	11	.27	7713	-1.3	.6	-26	315	37
2	11	.28	7816	8.5	.6	131	316	33
2	11	.45	7827	6.9	2.6	110	318	30
2	11	.43	7837	-1.0	.5	110	316	30

FLIGHT CONDITION: RIGHT TURN

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
2	12	.25	6678	14.3	-.2	126	317	27
8	12	.25	6703	17.0	-2.4	168	317	27
8	12	.21	6738	21.8	-4.2	105	317	27
8	12	.38	6816	21.5	3.5	21	318	24
8	12	.17	6819	19.9	1.6	28	318	25
2	12	.19	6833	7.9	6.6	247	320	29
8	12	.24	6868	32.1	6.6	419	320	21
8	12	.26	6874	33.5	1.4	496	318	18
8	12	.19	6874	35.7	7.2	391	320	21
8	12	.37	6887	39.9	1.3	254	321	20
8	12	.19	6888	21.3	6.3	349	320	26
8	12	.27	6891	15.5	.3	212	319	28
8	12	.34	6891	33.0	5.8	342	322	19
2	12	.33	6895	-2.9	5.6	226	319	29
8	12	.27	6902	26.1	1.4	342	318	24
8	12	.35	6905	27.3	2.4	504	318	18
8	12	.28	6906	40.6	-1.9	238	323	16

TABLE A-3 - Continued

FLIGHT CONDITION: RIGHT TURN (CONTINUED)

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
8	12	.26	6908	45.7	-2.7	252	323	18
8	12	.24	6914	29.2	1.3	496	318	18
8	12	.26	6919	39.8	-.8	294	323	19
8	12	.37	6919	40.9	.2	268	320	19
2	12	.22	6921	8.7	.8	468	315	30
8	12	.41	6922	25.6	5.8	279	320	26
8	12	.52	6922	28.5	.6	306	319	25
8	12	.27	6923	27.1	0.0	247	319	25
8	12	.24	6925	29.3	.8	461	318	22
8	12	.31	6925	30.5	.3	247	319	25
8	12	.28	6929	45.2	-5.0	343	324	18
8	12	.24	6930	21.6	.8	440	317	24
8	12	.41	6933	25.3	3.4	219	321	23
8	12	.26	6933	26.8	3.2	286	322	24
8	12	.26	6935	32.7	.6	440	317	20
8	12	.50	6939	35.1	-1.1	313	321	21
8	12	.47	6939	44.2	-1.6	308	323	21
8	12	.29	6942	31.7	.8	299	319	22
8	12	.32	6943	30.3	-1.4	377	320	21
8	12	.26	6946	28.7	2.4	426	316	24
8	12	.23	6949	20.7	8.2	63	319	22
8	12	.30	6949	37.5	-.3	334	316	23
8	12	.24	6950	28.1	.2	327	320	23
8	12	.28	6952	32.4	2.2	306	318	22
8	12	.23	6954	32.7	1.6	289	320	22
8	12	.47	6956	33.2	3.7	212	320	22
2	12	.32	6961	-5.9	10.4	77	318	29
8	12	.23	6961	36.9	-3.4	320	316	20
8	12	.21	6963	17.2	-1.9	-6	318	33
8	12	.33	6965	31.9	1.8	383	321	22
8	12	.40	6965	36.2	-1.9	322	323	20
8	12	.37	6968	34.3	2.7	311	320	20
2	12	.32	6976	7.2	-1.4	-47	320	28
8	12	.41	6980	13.8	-1.6	325	319	29
2	12	.33	6984	13.3	1.6	100	319	29
8	12	.41	6991	29.8	-.6	289	319	23
8	12	.14	6994	1.9	2.1	273	321	32
8	12	.21	6994	32.5	8.8	203	320	24
8	12	.21	6996	32.4	6.1	189	320	21
8	12	.34	6998	44.4	-.6	327	317	22
8	12	.23	7000	34.9	-2.1	313	318	20
8	12	.26	7001	31.3	-.2	315	323	24
8	12	.25	7002	30.0	-3.2	261	320	21
8	12	.29	7003	32.1	5.3	302	319	25
8	12	.31	7004	24.4	5.3	135	320	24
8	12	.27	7004	33.2	-2.4	261	320	22
2	12	.13	7008	9.3	2.1	278	320	28
8	12	.27	7008	25.8	-4.5	247	319	25
2	12	.19	7018	9.1	12.0	353	320	29
2	12	.32	7019	-1.9	3.4	-94	321	24
8	12	.23	7020	35.6	3.5	140	320	20
8	12	.36	7021	16.5	-.5	308	322	27
8	12	.37	7021	35.3	5.3	285	321	21
8	12	.33	7025	34.1	.8	249	322	20
8	12	.16	7029	43.1	-5.6	268	320	17

TABLE A-3 - Continued

FLIGHT CONDITION: RIGHT TURN (CONTINUED)

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
8	12	.22	7031	41.5	3.7	270	322	22
2	12	.32	7036	12.3	1.9	112	319	28
8	12	.16	7043	16.2	7.9	226	321	27
8	12	.29	7044	14.6	-.8	205	319	30
8	12	.30	7051	29.2	3.5	278	316	24
8	12	.34	7053	32.1	5.1	154	320	22
8	12	.33	7064	23.9	6.7	212	320	24
8	12	.45	7068	28.9	1.1	257	316	24
8	12	.35	7079	15.4	6.1	163	322	27
8	12	.47	7080	25.3	1.9	254	319	25
8	12	.17	7085	36.1	1.3	299	316	23
8	12	.23	7086	29.7	1.4	285	316	24
8	12	.23	7087	35.4	-7.5	232	320	20
2	12	.37	7089	5.6	-1.9	80	321	28
2	12	.28	7093	9.1	.5	-66	321	28
8	12	.23	7100	16.0	7.7	198	320	27
8	12	.37	7106	13.5	2.6	170	320	32
8	12	.23	7106	15.2	-3.0	261	318	32
2	12	.22	7112	.6	-.5	102	320	28
2	12	.40	7120	10.6	4.2	76	321	30
2	12	.27	7120	14.1	-2.2	217	316	35
8	12	.32	7121	34.8	8.3	306	318	18
8	12	.19	7126	20.2	4.6	292	317	24
8	12	.17	7129	36.9	-2.4	327	318	17
8	12	.26	7130	30.1	-2.2	300	319	23
8	12	.29	7132	23.9	2.6	268	320	24
8	12	.34	7134	38.3	-3.7	306	317	22
8	12	.37	7138	16.0	1.9	84	320	34
8	12	.36	7141	44.2	-2.6	342	322	21
2	12	.26	7143	6.4	.2	97	321	29
8	12	.30	7148	21.2	8.2	129	320	31
2	12	.21	7148	23.7	-.2	58	318	27
8	12	.26	7151	23.4	6.7	157	322	19
2	12	.24	7154	-1.1	-2.6	102	321	27
2	12	.18	7155	-1.0	6.1	212	319	32
8	12	.26	7156	31.3	4.0	264	317	24
8	12	.39	7160	20.7	.8	84	321	28
8	12	.19	7160	39.6	-6.4	171	320	25
2	12	.17	7164	1.8	-.5	95	320	30
8	12	.36	7165	30.8	-1.1	250	318	21
8	12	.24	7166	21.6	-1.0	63	321	31
8	12	.37	7168	22.6	-2.4	63	321	30
8	12	.21	7169	18.0	-.8	286	318	29
8	12	.27	7170	16.5	-1.8	70	318	29
8	12	.32	7170	22.1	5.0	136	320	26
8	12	.26	7170	38.0	-2.2	257	318	20
2	12	.13	7172	12.8	3.4	-61	317	30
8	12	.19	7173	39.0	4.6	257	318	20
8	12	.28	7178	21.2	4.5	143	320	23
2	12	.23	7186	-1.4	-7.2	63	317	35
8	12	.28	7190	29.3	4.3	306	319	23
8	12	.27	7193	33.7	5.3	65	319	20
2	12	.23	7198	-4.8	.3	-48	318	30
2	12	.32	7199	6.7	12.8	91	318	31
2	12	.27	7201	10.7	1.6	321	320	31

TABLE A-3 - Continued

FLIGHT CONDITION: RIGHT TURN (CONTINUED)

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
8	12	.29	7208	27.7	4.3	51	318	24
8	12	.38	7213	39.6	-7.9	140	321	17
8	12	.44	7214	23.9	0.0	36	321	26
8	12	.34	7216	44.6	-5.0	560	321	19
8	12	.28	7219	44.9	1.3	57	326	12
8	12	.19	7222	42.5	-3.8	71	324	20
8	12	.14	7226	44.6	.2	-5	323	21
8	12	.26	7228	19.1	.8	257	318	29
8	12	.27	7228	22.3	5.5	28	318	27
8	12	.15	7228	33.5	5.5	100	319	21
8	12	.21	7230	15.5	.6	271	317	27
8	12	.33	7232	19.6	-.5	285	320	26
8	12	.21	7237	37.3	6.6	86	318	22
8	12	.17	7249	43.8	7.5	93	320	18
2	12	.31	7250	-.6	-.3	80	318	30
8	12	.21	7251	30.9	8.3	455	320	22
8	12	.33	7252	41.7	7.7	86	319	22
8	12	.25	7253	32.7	3.7	135	319	20
8	12	.27	7263	28.2	2.4	128	318	23
8	12	.23	7263	33.8	5.0	100	321	19
8	12	.37	7263	43.9	1.3	335	321	22
8	12	.28	7265	32.5	2.7	285	318	23
8	12	.42	7267	21.3	5.5	149	317	28
8	12	.28	7267	25.3	1.6	257	317	25
2	12	.26	7271	13.0	.8	31	320	26
8	12	.26	7274	19.1	2.2	229	316	27
2	12	.22	7277	3.8	-1.0	-68	320	27
8	12	.43	7279	43.6	4.2	194	315	23
8	12	.19	7280	25.8	4.3	236	317	24
8	12	.15	7282	20.8	2.9	184	317	27
8	12	.12	7284	19.1	3.2	149	317	29
8	12	.30	7285	42.3	-6.3	292	316	17
8	12	.30	7288	37.5	-5.3	285	317	20
8	12	.32	7290	22.3	-3.7	243	317	27
8	12	.30	7294	28.1	-3.7	250	318	21
8	12	.21	7294	32.2	4.2	93	319	21
8	12	.49	7295	38.0	4.0	-5	322	21
8	12	.19	7297	26.9	1.9	264	317	26
8	12	.21	7297	30.5	2.9	100	319	22
8	12	.13	7298	26.8	2.2	271	318	23
8	12	.28	7299	44.9	2.9	-5	324	15
2	12	.27	7302	6.6	-1.8	93	317	33
8	12	.33	7303	34.1	.5	-54	322	24
8	12	.15	7304	43.6	1.3	271	316	20
8	12	.26	7308	44.1	-2.6	292	319	21
8	12	.36	7311	41.8	8.2	271	319	20
8	12	.27	7313	37.2	-3.5	107	319	21
8	12	.32	7314	39.8	-4.8	341	316	22
8	12	.21	7316	28.9	3.7	79	318	23
8	12	.27	7316	37.5	-4.3	114	320	19
8	12	.40	7318	41.5	-.8	257	318	24
8	12	.29	7321	29.5	-5.3	93	319	22
8	12	.30	7321	43.6	-7.2	355	316	17
8	12	.53	7322	44.7	2.2	334	319	21
8	12	.25	7323	22.1	.5	114	318	26

TABLE A-3 - Continued

FLIGHT CONDITION: RIGHT TURN (CONTINUED)

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
8	12	.26	7325	37.3	-.3	341	315	22
8	12	.26	7327	40.6	-2.2	362	316	19
8	12	.36	7329	43.8	-3.0	397	318	15
2	12	.20	7330	-8.2	1.6	135	318	32
8	12	.36	7335	16.0	1.9	250	317	30
8	12	.21	7341	40.2	-5.1	135	319	22
8	12	.23	7349	37.5	-8.5	100	321	19
8	12	.34	7357	16.5	3.2	208	318	30
8	12	.30	7359	34.3	3.5	475	316	21
2	12	.29	7360	14.3	1.8	80	319	30
8	12	.34	7361	13.0	1.8	222	317	30
8	12	.26	7365	38.3	5.5	362	317	17
8	12	.32	7368	37.3	-5.0	404	318	15
8	12	.30	7371	32.4	7.7	369	316	19
8	12	.23	7377	26.0	.5	121	317	25
8	12	.23	7385	25.8	1.4	128	317	27
8	12	.23	7387	29.7	3.0	285	316	22
2	12	.35	7389	10.6	-.5	130	320	32
2	12	.19	7392	19.9	.3	165	322	23
8	12	.23	7396	31.9	3.0	212	318	23
8	12	.25	7406	39.9	4.6	58	320	21
8	12	.32	7407	32.1	7.4	236	316	22
2	12	.29	7412	1.9	.2	130	320	28
8	12	.25	7414	30.0	-3.0	142	318	24
8	12	.21	7419	29.8	-.2	107	318	24
8	12	.19	7421	27.9	.6	100	318	24
8	12	.17	7430	29.8	3.2	58	319	24
8	12	.27	7432	33.5	5.0	121	319	22
8	12	.25	7433	31.9	-.8	114	318	24
2	12	.19	7438	6.7	1.4	86	316	33
2	12	.21	7447	11.5	9.9	265	320	28
8	12	.27	7449	35.9	4.3	100	317	23
8	12	.25	7452	34.8	1.6	128	319	21
8	12	.25	7465	29.2	-2.9	107	318	27
2	12	.29	7468	7.2	-1.3	130	319	32
2	12	.27	7468	9.6	.8	-6	317	30
8	12	.25	7470	30.8	-.8	100	319	27
8	12	.19	7472	28.1	3.0	72	318	25
8	12	.31	7476	28.4	3.7	65	318	24
8	12	.25	7484	28.5	2.6	58	318	26
8	12	.29	7489	21.3	2.6	65	317	29
8	12	.31	7517	17.6	2.2	58	317	31
2	12	.21	7545	6.3	1.8	-47	320	32
8	12	.25	7545	27.7	.2	100	317	25
8	12	.25	7549	26.0	2.7	86	318	24
2	12	.19	7555	7.9	.3	-61	322	29
8	12	.21	7570	30.5	4.6	229	315	28
8	12	.26	7606	38.3	3.5	348	318	17
8	12	.32	7620	33.7	-5.0	327	317	25
8	12	.43	7633	36.2	.6	327	317	22
2	12	.23	7648	2.9	.2	-82	322	29
8	12	.26	7651	37.0	-2.9	390	318	18
8	12	.28	7660	36.1	-1.0	362	317	22
8	12	.30	7665	35.1	-.2	334	317	21
8	12	.21	7674	31.4	-1.1	327	317	21

TABLE A-3 - Continued

FLIGHT CONDITION: RIGHT TURN (CONTINUED)

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
8	12	.28	7677	43.3	6.4	313	317	22
8	12	.26	7704	39.6	7.5	313	317	18
2	12	.28	7712	16.2	-2.7	-47	321	30
8	12	.32	7714	35.3	8.0	383	316	23
8	12	.32	7717	32.9	-1.0	355	318	21
8	12	.38	7738	36.7	8.3	320	316	25
2	12	.40	7762	.6	-3.7	306	314	35

FLIGHT CONDITION: CYCLIC PUSHOVER

2	13	.11	6774	7.4	-3.8	70	317	26
8	13	.11	6907	14.1	1.8	-20	319	28
8	13	.21	6929	5.5	9.5	272	321	27
2	13	.04	6933	-4.0	1.8	71	321	30
8	13	.10	7082	12.3	.5	254	320	31
2	13	.08	7098	7.4	8.8	170	319	30
8	13	.13	7140	5.9	9.6	143	320	27
2	13	.04	7157	5.3	11.2	191	321	28
2	13	.11	7167	2.9	5.9	321	318	34
8	13	.08	7218	12.8	2.2	44	318	30
2	13	.10	7219	11.2	10.7	250	320	30
2	13	.02	7254	14.4	2.1	264	318	33
2	13	.10	7278	8.7	2.1	72	318	32
8	13	.06	7350	8.5	4.6	229	316	34
8	13	.08	7483	9.8	-1.0	30	316	32
8	13	.10	7518	8.0	2.4	51	316	33

FLIGHT CONDITION: CYCLIC PULL-UP

8	14	.04	6779	15.5	-1.0	63	316	30
8	14	.13	6907	12.7	-2.2	0	317	29
8	14	.09	6930	13.5	7.5	265	320	29
2	14	.06	6934	-.2	-.5	78	321	31
2	14	.06	6954	7.9	0.0	14	318	30
2	14	.08	6968	18.0	1.0	278	317	29
8	14	.06	6973	17.8	-1.6	91	320	23
8	14	.08	7021	17.5	-2.2	332	323	22
2	14	.09	7165	14.6	.8	321	320	32
8	14	.09	7199	19.9	1.6	143	321	24
2	14	.09	7212	14.3	-.3	84	319	33
8	14	.11	7351	15.4	.6	236	318	28
8	14	.09	7419	16.5	3.7	229	314	31
2	14	.12	7513	17.0	2.9	37	317	30
2	14	.10	7520	14.4	-.5	51	317	30
2	14	.07	7546	15.7	3.2	8	321	24
2	14	.06	7686	10.3	3.0	-33	316	33

FLIGHT CONDITION: LONGITUDINAL REVERSAL

8	15	.04	6960	31.4	4.3	212	321	20
2	15	.05	7137	1.8	1.8	76	321	30
2	15	.06	7187	-4.0	-8.2	70	317	34

FLIGHT CONDITION: LATERAL REVERSAL

2	16	.02	7004	16.2	-1.3	287	321	29
2	16	.04	7276	-.8	1.4	66	319	26
2	16	.11	7462	-.5	-.3	342	319	28

TABLE A-3 - Continued

FLIGHT CONDITION: RUDDER REVERSAL

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
8	17	.06	7077	17.3	8.7	163	321	28
2	17	.08	7078	13.9	1.6	112	317	35
2	17	.06	7115	17.2	6.4	182	319	27
8	17	.04	7134	12.7	11.1	150	320	26
8	17	.04	7139	15.1	10.6	150	321	24
8	17	.11	7149	14.1	7.4	136	321	23
8	17	.09	7155	16.8	5.1	143	321	24
2	17	.06	7157	6.6	9.6	177	319	35
2	17	.08	7181	7.5	6.9	198	319	32
8	17	.06	7206	19.4	4.6	84	319	26
8	17	.06	7214	42.8	-7.1	154	320	19
8	17	.04	7236	16.8	1.6	0	317	32
2	17	.06	7448	-.5	6.6	349	319	30
2	17	.11	7579	1.9	10.4	412	319	35
2	17	.09	7583	1.8	9.5	377	319	35
2	17	.06	7591	.8	7.4	349	319	32
2	17	.12	7716	-1.3	-.6	-5	315	37

FLIGHT CONDITION: LEFT SIDEWARD FLIGHT

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
2	18	.34	6964	7.1	9.0	35	319	28
2	18	.31	7059	9.8	9.1	346	319	31
2	18	.27	7198	1.3	-.8	205	318	32
2	18	.35	7281	3.8	3.2	100	317	34
2	18	.32	7381	-3.8	4.6	293	319	32
2	18	.40	7534	7.1	5.0	93	316	33
2	18	.40	7580	5.0	6.7	30	315	34
2	18	.34	7582	.5	10.1	391	323	33
2	18	.32	7705	14.9	8.3	384	320	29
2	18	.25	7715	-8.2	1.4	-33	317	32

FLIGHT CONDITION: RIGHT SIDEWARD FLIGHT

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
2	19	.32	7197	-9.8	-1.8	105	317	31
2	19	.34	7259	-7.7	-6.6	59	318	32

FLIGHT CONDITION: FLIGHT CONDITION SEPARATION

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
8	20	0.00	6895	28.9	-2.6	468	318	19
8	20	0.00	6906	40.6	-1.9	238	323	16
8	20	0.00	6923	27.1	0.0	247	319	25
8	20	0.00	6968	30.3	3.0	355	321	20
8	20	0.00	6998	44.4	-.6	327	317	22
8	20	0.00	7002	30.0	-3.2	261	320	21
2	20	0.00	7007	-4.0	1.4	-12	320	32
8	20	0.00	7009	40.1	-7.7	295	322	11
8	20	0.00	7015	40.9	4.2	168	318	26
2	20	0.00	7016	-3.5	0.0	-26	321	29
2	20	0.00	7047	-6.7	-2.7	-45	319	33
2	20	0.00	7054	-6.7	-.8	179	317	29
8	20	0.00	7085	36.1	1.3	299	316	23
8	20	0.00	7166	21.6	-1.0	63	321	31
8	20	0.00	7228	19.1	.8	257	318	29
2	20	0.00	7244	-9.9	3.7	-6	316	32
8	20	0.00	7249	43.8	7.5	93	320	18

TABLE A-3 - Continued

FLIGHT CONDITION: FLIGHT CONDITION SEPARATION (CONTINUED)

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
2	20	0.00	7254	.5	4.3	-55	318	32
8	20	0.00	7263	28.2	2.4	128	318	23
2	20	0.00	7265	.2	-10.7	38	319	29
8	20	0.00	7265	32.5	2.7	285	318	23
8	20	0.00	7272	43.6	-5.6	271	318	15
8	20	0.00	7282	20.8	2.9	184	317	27
8	20	0.00	7285	42.3	-6.3	292	316	17
8	20	0.00	7297	26.9	1.9	264	317	26
8	20	0.00	7313	37.2	-3.5	107	319	21
8	20	0.00	7318	41.5	-.8	257	318	24
8	20	0.00	7325	37.3	-.3	341	315	22
8	20	0.00	7327	40.6	-2.2	362	316	19
2	20	0.00	7341	14.1	.5	348	315	29
8	20	0.00	7359	27.7	-.2	142	321	13
2	20	0.00	7361	2.4	2.1	-54	320	33
8	20	0.00	7362	30.0	2.1	79	318	21
8	20	0.00	7365	38.3	5.5	362	317	17
2	20	0.00	7381	-.8	.2	-40	321	34
2	20	0.00	7389	.8	0.0	-68	322	32
8	20	0.00	7402	29.3	-.6	184	319	23
2	20	0.00	7406	.6	-3.2	251	319	34
2	20	0.00	7432	-3.8	1.6	179	319	31
2	20	0.00	7436	-3.8	4.2	21	316	35
2	20	0.00	7440	-9.3	1.3	165	319	32
2	20	0.00	7443	-2.7	4.0	0	317	33
8	20	0.00	7473	21.6	3.5	58	319	29
2	20	0.00	7483	6.7	3.8	65	319	31
2	20	0.00	7514	-.8	3.4	-5	320	32
2	20	0.00	7522	-3.0	1.8	-40	320	34
8	20	0.00	7714	35.3	8.0	383	316	23

FLIGHT CONDITION: REARWARD FLIGHT

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
2	21	.29	6897	-9.1	1.3	226	318	30
2	21	.27	6906	-1.9	-2.2	114	320	32
2	21	.33	6915	-1.8	-4.2	99	320	32
2	21	.96	6944	-.2	-3.0	268	318	30
2	21	1.25	6950	.2	-2.7	191	318	33
2	21	.21	6955	-5.3	-2.2	348	315	30
2	21	1.04	6999	3.0	4.0	135	319	30
2	21	.37	7017	-8.8	7.9	367	319	32
2	21	.32	7040	-7.2	-6.3	3	321	30
2	21	.17	7046	-3.0	-6.1	200	315	34
2	21	.65	7095	-.8	6.1	93	320	30
2	21	1.29	7119	-2.7	1.4	219	319	32
2	21	.32	7141	-5.8	-6.6	105	320	36
2	21	.31	7143	.3	1.4	58	318	31
2	21	.84	7147	-.6	3.5	212	319	33
2	21	.35	7150	-6.6	4.5	233	316	39
2	21	.33	7153	-1.0	-1.6	147	321	32
2	21	.31	7157	-1.4	7.4	240	318	34
2	21	.23	7159	-10.7	-.5	177	320	31
2	21	.21	7164	.5	-4.5	321	318	35
2	21	.43	7164	.5	-.8	154	321	31
2	21	.53	7167	.2	.5	212	318	33

TABLE A-3 - Continued

FLIGHT CONDITION: REARWARD FLIGHT (CONTINUED)

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
2	21	.21	7169	-9.8	2.4	121	319	33
2	21	.13	7182	-4.6	-.2	-48	318	31
2	21	.25	7185	-4.3	-1.6	-55	317	31
2	21	.64	7185	-1.8	-.2	125	320	32
2	21	.26	7193	-1.4	-2.7	98	321	31
2	21	.34	7201	-1.0	-1.4	363	316	35
2	21	.49	7204	-3.4	4.6	198	318	34
2	21	1.51	7249	-.6	-2.7	264	316	30
2	21	.78	7299	-4.8	-.5	128	319	30
2	21	.28	7308	-1.0	-3.5	293	317	33
2	21	.63	7317	3.8	1.0	-54	321	30
2	21	.16	7331	-8.0	4.6	128	318	31
2	21	.52	7331	-1.1	6.9	86	316	32
2	21	.35	7372	-1.3	.2	72	317	35
2	21	.21	7373	-.3	-2.6	79	315	35
2	21	.60	7386	-2.2	-3.8	293	317	36
2	21	.43	7404	-3.4	0.0	265	318	34
2	21	.26	7429	-3.4	6.9	349	320	29
2	21	.28	7466	-5.8	2.4	377	318	33
2	21	.21	7492	-2.2	-4.5	391	319	34
2	21	.30	7503	-.8	-1.6	370	318	35
2	21	.79	7505	-1.8	-1.4	86	314	36
2	21	.23	7554	.2	-1.3	82	318	33
2	21	.62	7610	-3.4	-.6	-95	317	36
2	21	.53	7622	-2.2	-5.1	405	320	33
2	21	.21	7627	-.2	7.5	362	316	32
2	21	.32	7637	-2.9	-2.6	370	319	33
2	21	.34	7666	-1.3	-3.7	398	318	36
2	21	.34	7679	-1.9	-1.1	363	319	34
2	21	.21	7690	.6	-5.5	264	313	35
2	21	.25	7707	-1.0	-.2	8	315	35
2	21	.32	7809	-.5	-4.3	159	315	33
2	21	.23	7814	-2.9	-2.7	166	315	34
2	21	.30	7824	-2.6	-2.7	138	316	33

FLIGHT CONDITION: INITIATION OF ASCENT

2	22	.17	6676	4.3	7.4	126	316	30
2	22	.17	6776	13.0	4.2	346	322	27
2	22	.17	6845	13.3	.5	461	316	29
2	22	.06	6868	16.0	6.4	107	319	33
2	22	.19	6957	7.9	-1.4	-40	320	30
2	22	.28	7002	-1.3	6.7	-66	319	33
2	22	.25	7009	5.3	2.9	123	316	28
2	22	.14	7014	-4.6	-2.2	396	319	32
2	22	.20	7034	-.3	1.8	390	316	28
2	22	.26	7092	-.3	.3	102	320	25
2	22	.19	7103	10.7	1.0	76	321	31
2	22	.27	7103	15.1	7.4	42	317	30
8	22	.22	7113	13.1	0.0	119	318	41
2	22	.08	7132	11.9	1.0	149	317	38
2	22	.15	7134	1.3	6.7	44	317	34
2	22	.14	7157	6.9	-2.2	314	320	31
2	22	.14	7189	6.3	2.6	114	321	28
2	22	.15	7195	2.9	3.5	8	316	35

TABLE A-3 - Continued

FLIGHT CONDITION: INITIATION OF ASCENT (CONTINUED)

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
2	22	.16	7240	8.3	1.3	73	318	32
2	22	.24	7241	-2.7	6.4	-10	320	28
2	22	.22	7260	9.1	1.9	-61	321	28
2	22	.12	7264	9.5	3.2	86	320	31
2	22	.09	7277	1.3	1.1	-5	319	36
2	22	.15	7311	2.4	-.5	209	319	31
2	22	.08	7320	10.7	1.1	100	317	31
2	22	.12	7371	10.4	3.2	123	319	34
2	22	.14	7402	8.3	.8	-89	321	29
2	22	.19	7413	5.3	2.2	321	319	29
2	22	.13	7423	.6	-1.9	133	320	32
2	22	.11	7477	9.1	2.2	26	318	28
2	22	.09	7550	12.0	0.0	-68	321	32
2	22	.12	7567	9.0	.6	-123	317	32
2	22	.10	7616	13.3	1.8	-74	316	32
2	22	.21	7658	-.2	-3.7	-60	316	30
2	22	.19	7792	7.7	1.9	96	316	30

FLIGHT CONDITION: POP-DOWN

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
2	23	.12	7285	4.8	3.5	107	318	34
2	23	.17	7306	12.2	.8	114	316	34
2	23	.10	7421	13.1	-1.9	44	317	33
2	23	.15	7449	-1.3	5.5	384	318	33
2	23	.14	7644	20.4	0.0	-40	323	23
2	23	.12	7654	23.9	-1.3	-40	323	25

FLIGHT CONDITION: AIRSPEED ACCELERATION

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
8	25	.48	6805	8.0	-.3	240	321	28
8	25	.21	6841	21.2	-1.3	318	321	26
8	25	.39	6871	20.5	-3.4	219	320	26
8	25	.20	6880	7.2	-2.7	219	318	32
8	25	.23	6929	21.0	-.2	299	317	24
2	25	.19	6932	-3.4	-1.9	85	320	30
8	25	.21	6953	3.7	-1.3	327	315	29
2	25	.31	6967	-4.5	-2.2	198	319	30
8	25	.38	6993	4.6	-.3	266	318	38
8	25	.28	7003	14.3	1.8	273	321	29
8	25	.34	7006	6.7	3.0	229	316	28
8	25	.32	7031	-.3	5.1	133	317	34
8	25	.29	7033	16.4	4.2	282	318	28
8	25	.33	7034	7.7	.5	200	319	32
8	25	.25	7042	3.7	4.6	198	319	32
8	25	.23	7099	3.4	7.2	236	316	29
8	25	.19	7129	.3	-3.8	98	321	30
8	25	.24	7133	11.1	4.3	136	318	31
8	25	.26	7136	14.6	1.4	306	316	28
8	25	.06	7139	-.8	-4.8	112	321	29
8	25	.19	7141	14.3	3.8	327	316	31
8	25	.32	7144	22.3	3.8	342	319	28
2	25	.21	7150	2.6	-2.1	37	318	31
8	25	.22	7161	9.5	-6.1	143	318	33
8	25	.32	7162	.2	8.8	328	320	31
2	25	.39	7163	-3.4	2.6	226	317	33

TABLE A-3 - Continued

FLIGHT CONDITION: AIRSPEED ACCELERATION (CONTINUED)

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
8	25	.52	7175	10.7	-1.1	285	319	31
8	25	.39	7186	-7.7	-.2	105	320	32
2	25	.32	7190	.5	.2	84	321	31
2	25	.37	7199	1.6	-3.2	84	321	30
2	25	.37	7203	7.9	-2.7	84	320	34
8	25	.38	7203	10.3	2.9	215	316	31
8	25	.41	7210	11.9	10.7	285	319	34
8	25	.23	7210	23.2	3.5	50	321	26
8	25	.28	7220	27.6	-1.3	469	319	26
8	25	.30	7228	7.2	-2.1	-5	320	32
8	25	.17	7229	13.0	6.3	229	320	33
8	25	.36	7259	1.9	2.2	285	316	34
8	25	.23	7268	8.0	7.4	278	320	31
8	25	.21	7292	21.6	1.0	-26	321	27
8	25	.28	7313	-1.4	3.7	-61	320	34
8	25	.35	7328	1.4	1.3	114	317	31
8	25	.19	7328	19.2	1.0	271	317	30
8	25	.23	7338	17.8	-.2	369	315	28
2	25	.13	7344	1.8	3.0	223	319	31
8	25	.36	7351	.2	8.2	418	313	34
8	25	.33	7355	5.0	3.4	16	317	36
8	25	.23	7413	9.1	5.3	8	316	34
2	25	.17	7421	10.3	4.2	335	319	34
2	25	.19	7427	-2.9	-2.7	349	319	31
2	25	.30	7436	-1.1	4.0	356	318	34
8	25	.31	7436	7.9	1.6	86	316	32
2	25	.19	7445	-2.2	-1.3	349	318	32
8	25	.54	7448	4.3	4.2	51	318	33
2	25	.21	7510	3.5	3.2	33	317	34
8	25	.40	7510	4.6	6.6	16	317	33
2	25	.19	7518	4.8	3.7	33	318	31
2	25	.31	7519	-2.9	.2	51	315	36
8	25	.28	7551	10.6	-3.4	334	313	33
2	25	.24	7558	-2.2	-1.8	356	320	32
2	25	.28	7566	2.6	2.1	370	320	32
2	25	.26	7574	-1.3	-3.8	342	320	33
8	25	.21	7588	5.3	8.0	285	314	31
2	25	.21	7614	-1.9	0.0	-109	317	35
2	25	.25	7637	8.3	.8	-54	317	34
2	25	.33	7651	2.6	1.6	-19	316	37
8	25	.53	7688	3.0	-1.6	243	316	30
2	25	.17	7692	2.2	3.7	-47	316	33
2	25	.19	7703	6.6	4.5	-74	316	33
8	25	.36	7742	10.4	1.8	271	316	32
8	25	.17	7751	16.4	4.2	362	316	28
8	25	.23	7757	1.0	.5	285	314	35

FLIGHT CONDITION: QUICK STOP

8	26	.25	6786	41.7	-4.5	318	323	16
8	26	.21	6810	38.5	-2.2	276	323	19
8	26	.21	6836	41.4	3.0	290	324	14
8	26	.13	6854	14.3	2.7	468	316	26
8	26	.20	6876	27.4	-1.6	254	322	17
8	26	.22	6923	30.9	2.7	489	318	20

TABLE A-3 - Continued

FLIGHT CONDITION: QUICK STOP (CONTINUED)

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
8	26	.13	6948	27.4	4.2	327	322	19
8	26	.16	6952	19.4	-1.3	219	321	23
8	26	.21	6959	40.6	-4.0	362	319	14
2	26	.16	6965	19.1	-.6	219	320	26
8	26	.15	6974	43.8	-9.3	189	322	14
8	26	.21	6997	33.0	-1.9	287	325	15
8	26	.16	7002	24.0	6.3	177	321	19
8	26	.15	7010	30.6	4.5	299	321	22
8	26	.14	7022	27.1	8.7	191	322	21
8	26	.19	7044	31.9	5.9	353	321	21
8	26	.12	7052	26.0	10.1	268	322	18
8	26	.21	7060	34.8	7.7	339	322	20
8	26	.16	7067	23.9	3.2	254	320	23
8	26	.13	7102	27.1	3.4	313	318	22
8	26	.17	7130	24.5	-1.9	91	322	24
8	26	.09	7142	21.2	-3.0	105	322	27
8	26	.15	7144	36.1	-.5	355	319	19
8	26	.13	7145	19.9	6.3	136	322	22
2	26	.15	7146	25.2	1.1	72	319	24
2	26	.25	7160	29.8	2.4	254	322	18
8	26	.17	7162	34.5	3.0	58	319	20
8	26	.15	7166	29.0	6.4	143	321	19
8	26	.17	7183	35.7	3.4	44	320	19
8	26	.12	7186	30.8	.3	314	321	22
2	26	.26	7188	28.1	.5	119	324	22
2	26	.11	7196	26.6	0.0	84	321	27
2	26	.15	7200	28.4	-2.4	91	323	23
8	26	.29	7204	43.1	8.7	321	321	20
8	26	.23	7213	36.9	6.9	285	321	21
8	26	.17	7223	27.6	6.3	264	321	23
8	26	.25	7246	40.9	8.3	93	320	18
8	26	.32	7253	39.0	2.2	292	319	20
8	26	.17	7260	25.2	.6	299	318	23
8	26	.23	7275	34.6	5.0	278	320	24
8	26	.17	7309	34.8	-4.8	121	321	24
8	26	.30	7316	32.9	7.2	349	321	19
8	26	.17	7335	34.6	1.6	107	319	22
8	26	.27	7338	43.9	-5.3	114	320	18
2	26	.17	7343	22.9	2.2	230	321	27
8	26	.28	7348	33.0	10.3	439	316	20
8	26	.23	7353	39.0	3.0	404	315	21
8	26	.27	7374	39.4	1.6	79	318	25
8	26	.23	7389	34.9	-1.3	114	319	19
2	26	.12	7390	25.2	.3	165	321	27
2	26	.15	7419	31.3	1.9	398	322	23
2	26	.15	7425	15.2	.5	349	318	33
8	26	.21	7425	36.7	1.0	44	320	21
2	26	.17	7433	27.6	4.5	384	320	28
8	26	.15	7437	29.8	-.6	147	321	24
8	26	.19	7442	30.6	-1.1	121	319	19
2	26	.09	7443	22.1	1.4	370	320	29
8	26	.19	7450	33.2	6.3	114	321	18
8	26	.19	7494	30.0	1.6	86	319	25
2	26	.15	7508	28.9	2.1	96	321	20
2	26	.13	7516	28.9	4.3	75	321	24

TABLE A-3 - Concluded

FLIGHT CONDITION: QUICK STOP (CONTINUED)

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
8	26	.19	7553	37.0	-4.8	320	319	16
2	26	.17	7556	22.3	1.6	384	320	31
2	26	.13	7563	25.6	3.4	391	320	27
2	26	.19	7572	22.0	.6	370	320	31
8	26	.26	7592	36.9	5.0	292	317	21
2	26	.15	7612	22.0	1.8	-88	319	30
8	26	.26	7629	37.7	10.3	397	318	16
2	26	.12	7635	27.3	-1.3	-5	318	27
2	26	.21	7648	28.7	2.2	8	317	29
2	26	.15	7690	18.0	1.4	-12	318	26
8	26	.21	7695	38.6	8.3	278	317	20
2	26	.12	7701	25.8	1.6	-26	318	28
8	26	.34	7746	43.9	12.3	390	318	18
8	26	.17	7752	43.6	3.0	320	317	24

FLIGHT CONDITION: POP-UP

MISSION SEGMENT	FLIGHT COND	TIME (MIN)	GROSS WEIGHT	FORWARD AIRSPEED	LATERAL AIRSPEED	ALTITUDE	RPM	TORQUE
2	30	.19	6982	5.8	0.0	1	319	34
2	30	.28	7126	5.8	1.0	76	321	27
2	30	.26	7133	6.9	1.3	69	321	28
2	30	.21	7139	6.6	2.9	69	322	27
8	30	.11	7155	15.5	10.6	143	319	28
2	30	.27	7177	6.1	6.4	-61	317	32
2	30	.19	7208	3.0	-3.0	0	318	31
2	30	.12	7210	2.7	3.5	128	320	31
2	30	.16	7227	6.1	1.3	114	319	35
2	30	.18	7258	.8	1.1	86	318	30
2	30	.23	7268	5.9	.3	73	319	29
2	30	.17	7353	4.0	.5	-61	322	12
2	30	.21	7375	16.0	5.1	84	318	30
2	30	.10	7399	13.8	3.7	130	318	36
2	30	.12	7404	9.6	2.6	116	319	32
8	30	.23	7418	13.9	7.7	222	316	28
2	30	.30	7550	5.9	2.1	349	319	34
2	30	.24	7593	-.6	5.6	349	318	35
2	30	.12	7596	10.7	2.7	-144	317	33
2	30	.12	7600	12.0	3.4	-123	318	31
2	30	.16	7645	3.7	.3	-82	322	28
2	30	.26	7650	5.8	.5	-82	322	28
2	30	.16	7655	1.0	-.2	-68	322	28
2	30	.17	7679	13.6	2.1	-60	317	31
2	30	.12	7681	12.3	1.9	-47	316	32
2	30	.12	7690	17.6	.5	-60	317	31